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ABSTRACT

This publication presents 18 papers from the 1990 institute on facilities finance in higher education. An introduction is by Walter W. Schaw. Papers are: (1) "Facilities as a Capital Asset" by Sean C. Rush; (2) "State Issues in Capital Management" by Brenda N. Albright; (3) "Policy-making Issues" by Frederick R. Ford; (4) Financing Options" by David M. Cyganowski; (5) "Funding Sources" by John W. Gibb; (6) "Sale/Leaseback: A Brief Discussion" by David M. Cyganowski and John W. Gibb; (7) "Contracting for Services" by William D. Middleton; (8) "Real Estate Management: A Growing Institutional Responsibility" by Myron P. Curzan; (9) "Campus Planning" by Clinton N. Hewitt; (10) "Vanderbilt University Boiler Plant Expansion Report" by Jon M. Gullette; (11) "Utilities Paybacks" by Dennis C. Watson; (12) "Building New versus Renewal or Renovation" by William D. Middleton; (13) "Case Study: State of Tennessee System" by Brenda N. Albright; (14) "Case Study; Purdue University" by Frederick R. Ford; (15) "Case Study: Vanderbilt University" by Jon M. Gullette; (16) "Case Study: Denison University" by J. Leslie Hicks, Jr.; (17) "The Outlook for the 1990s in Higher Education" by Arthur M. Hauptman; and (18) "Making Tough Budget Choices" by William S. Gardiner. An appendix contains a paper on "Principles of Accounting" by R. Eugene Hindman, Jr. Also included is a list of speakers at the institute. (Contains 72 references.) (JB)

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FACILITIES STEWARDSHIP IN THE 1990s

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FACILITIES STEWARDSHIP IN THE 1990s

Proceedings of the First Institute for Facilities Finance in Higher Education

November 1990
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Acknowledgments

Sixty-seven facilities and business officials attended APPA's first Institute for Facilities Finance in Higher Education, which was presented November 4-6, 1990 on the Georgetown University campus in Washington, D.C. Facilities Stewardship in the 1990s represents the collected presentations of the institute faculty members, who were drawn from higher education, business, and financial institutions. Some papers were rewritten by the authors for this publication. APPA gratefully acknowledges the faculty's contributions to the institute and to this book.

Walter A. Schaw, APPA executive vice president, devised the institute curriculum and selected the faculty. Special thanks go to the National Association of College and University Business Officers for its significant contributions.

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Introduction

Walter A. Schaw
Executive Vice President
APPA

The promise of this first APPA Institute for Facilities Finance was to open up new possibilities, new alternatives, new concepts in the financial management of facilities, and to promote recognition of facilities as an institution's largest capital asset. We would be overly ambitious if we thought we had the answer to every question, but we hoped to open some new horizons and share positive experiences.

One of the Institute's high points was the presentation by Sean Rush. He presents a conceptual foundation that parallels our stewardship of the endowment with our need to treat facilities as our largest capital asset. Our objective is to maintain power over that asset.

In 1987, APPA, NACUBO, and SCUP coined the concept of facilities equilibrium. To paraphrase, equilibrium is achieved when annual investments in facilities maintain their functional and financial value over the long term. Part of the challenge we face is replacing that part that was inappropriately drawn down in the past generation and bringing it into balance to ensure that the next generation will have undiminished opportunities.

Art Hauptman discusses the future of higher education in the United States. We know that unless we look for new methods and alternatives, the 1990s are going to be unkind to us. We need to be willing to take on some uncomfortable issues. He also argues that we are much more sophisticated managers than we were ten years ago, and perhaps more sophisticated than we give ourselves credit for. I am reminded of that every time we are attacked on the subject of tuition. I can tell you that the enterprise of higher education has been underfunded for some time. If we do not tell our story, no one is going to tell it for us.

There are some surprises for readers in these pages. For example, I am sure that no one ever thought they would hear an APPA president say that we have to look at contract maintenance as an alternative, or that APPA has adopted this as a major area of inquiry in its long-range plan. We cannot just go around saying that we are efficient managers--we must demonstrate it by looking at alternatives. The well-being of our institutions has to be our priority mission.

Brenda Albright mentions the need for awareness by state leadership. Almost by accident, APPA got involved in state

initiatives. We have been in Texas, for example, a state that is considering a recommendation from its higher education planning commission that no new construction projects be completed until it reduces deferred maintenance backlogs by 70 percent. This is a pretty strong statement. We have been there to testify to the legislature, and when APPA presented workshops in Texas in 1989, Brenda was part of our team. In Alabama, we had the opportunity to inform members of the legislature that they had a $561 million problem. If they wanted to wait another three years, they could solve a $1 billion problem, because the numbers would only continue to climb.

There are four key ingredients to success in the facilities finance area: commitment, discipline, leadership, and teamwork.

Commitment

One of the things to look for in finding the secret of success is common values, and the place to begin is with commitment. Commitment to facilities and to the institutional mission is an essential component of quality education. On the other hand, one of the papers describes a college dean who chose to use poor-quality materials in a new building. In the next five or ten years, that dean probably will have moved on from that college; I would suggest that his commitment is mainly to himself.

Discipline

Business officers in these pages often refer to reserves that they have accumulated. They keep this money to take care of facilities as they go, and often it is a substantial amount. Whatever you call it, what matters is the discipline to maintain it year in and year out. If you have shortfalls in some years, you need to make it up in others. Some of the reserves that we suggest--2 or 2.5 percent--are minimal when compared to what industry requires.

Discipline means resisting pressure. Facilities were not the only thing neglected during in the 1970s; we have been trying to make up faculty salaries ever since. But it all needs to be done in a balanced fashion, and it is not necessarily going to be popular or peaceful.

Leadership

We have seen some positive changes in leadership during the past two years on the part of college and university presidents. There seems to be a new recognition of the problems of facilities. What we hear when we meet with presidents is, "We know about the problem." And although they may pass the buck to the trustees, they have come a long way in recent years. Not long ago most university presidents denied that any problem existed.

When institutions have bitten this bullet even as recently as two years ago, they are so much better off today. And I can guarantee that those who start today will be much better off than those who stall for three or four more years.

Leadership implies risks. I heard a powerful remark at another recent APPA seminar: "Life without risks is a walking death." The question will always center around which risks are worth taking. But there is no question that true leadership involves taking some risks.

Teamwork

Teamwork is obviously needed between institutions within states, and this includes private consortia as well as public. Some of the best opportunities for saving money and improving efficiency exist in a consortium.

Teamwork as an essential to success is not just limited to institutions working together. We have seen mighty things happen when the business officer teams with the facilities officer to produce a video about deferred maintenance. This occurred at the University of Houston recently, and has happened in a dozen other colleges and universities around the country. They took the video right to the trustees and suddenly wound up with increased appropriations. They took the risk, and they told their story.

Whenever something affects our ability to solve a facilities problem, we at APPA want to work with others to form coalitions, partnerships in higher education. Neither are our audiences restricted. Anytime we get an opportunity to address a facilities issue, APPA is there, and that includes audiences of university presidents.

Last summer I spoke to an audience of university presidents in Spain. I suggested to them that 100 years from now, few of them will be remembered at their institutions, but all of them will have left an imprint that will identify each of them as either a builder or a user. Facilities are just one of the issues that will make that mark, but they are usually an accurate measure of the choices that have been made. They say more about effective administration than many of us realize. Do you want to be a builder or a user? The choice is up to you.

Facilities as a Capital Asset

Sean C. Rush
Partner, Higher Education Consulting Services
Coopers & Lybrand

Thank you for inviting me to speak at your meeting. I would like to discuss a variety of topics, one of which is facilities as a capital asset. It's a topic about which most of you with financial backgrounds are well aware. However, I would like to do some comparisons to other categories of financial assets, particularly the endowment, as a means to develop a model for looking at facilities.

How can we better manage facilities now and in the future to ensure that these assets--necessary for teaching, research, and public service--are available at the turn of the century and beyond?

I'm sure most of you are by now familiar with the APPA/NACUBO/Coopers & Lybrand report, The Decaying American Campus: A Ticking Time Bomb. The October 10, 1990 issue of the Chronicle of Higher Education contained a major article on the topic of facility renewal. It is a topic that has been gaining considerable prominence over the last several years, and with good reason.

Just to refresh your memory, the problem began to emerge around 1950. At that time, there were about 1,800 colleges and universities in the United States. Returning GIs taking advantage of the Serviceman's Readjustment Act, more commonly known as the GI Bill, began to continue their educations in the late 1940s and early 1950s. That was coupled with the baby boom, of which I am a product, and a series of activities in the area of research. When the Russians launched Sputnik in the mid 1950s, there was a scramble in this country to catch up, and there was a massive investment in the research infrastructure and therefore growth in facilities of colleges and universities. In addition, an extension of financial aid programs to the poor and disadvantaged continued the demand for higher education well into the 1970s.

The number of institutions grew from about 1,800 to about 3,300 today, and between 1955 and 1975 new colleges and universities opened at a rate of about one every two weeks in this country, particularly the community colleges. In addition to the rapid growth in the absolute number of institutions, there was dramatic growth in the total square footage. In 1950 there was about 600 million gross square feet of college and university space in this country; today there is about 3 billion. This reflects both the growth of existing institutions as well as the

creation of new ones.

During that period there was enormous investment in the existing structure, yet little planning for the renewal of those facilities over time. All the capital that might have been deployed to reinvest in facilities was put toward new growth, and there were legitimate reasons for that. There was a surging demand for colleges and universities, and the emphasis was on constructing new space.

What occurred was a systematic decline in the financial and functional value of college and university space. Part of that was due to just growth, and part was due to increased federal regulation. There were new standards for fire and safety codes, the removal of architectural barriers to the handicapped, asbestos removal, and leaking underground storage tanks, as well as new laboratory animal standards and a host of other federal and state regulations. While these initiatives were important, they depleted the capital that might have been available to reinvest in these facilities.

The last issue that has gotten us into the current situation of a $60 billion backlog of deferred maintenance is the ongoing budgetary pressure that colleges and universities are facing. The 1980s, despite all the doom and gloom that was predicted at the beginning of the decade, turned out to be one of the most prosperous decades for colleges and universities. Although enrollments were flat, colleges and universities were creative and innovative in reaching out to new student markets and tapping new research dollars. It was a robust and healthy period. This year, however, the rubber has finally hit the road for a number of institutions. We have seen many institutions in the northeast and other parts of the country experiencing budgetary cutbacks and enrollment drops. The budgetary pressures that were predicted for the 1980s are coming to roost at this time. Consequently, fewer dollars are available for facility renewal and funding, and spending will continue to be constrained over the next decade.

In addressing the concept of facilities as a capital asset, I will discuss several models for managing facilities that may enable us to get a better handle on what our facility assets are like, what they need, and the level of investments we need to make. I will also provide you with some tools to elevate the discussion of facilities management to the policy level of the institution--the governing board, the president. I think there are some compelling arguments that can be made when you can compare the facility asset to other categories of assets that will heighten people's concern.

What I would like to talk about is facilities as an institutional asset, and to look at some models that we can use to manage facilities as a portfolio. The term portfolio is something typically applied to endowments and financial holdings. I will argue that facilities are also a portfolio of diverse assets and can be managed accordingly.

I will go through, briefly, some approaches to facilities condition audits and inspections, some assessments of the data that comes out of those inspections, and look at some decision support models that institutions can apply in looking at facility

funding needs and facility conditions. We will also discuss the notion of facilities equilibrium. What does it mean? The notion of facilities equilibrium first came up in Financial Planning Guidelines for Facility Renewal and Adaption, a monograph prepared about a year ago jointly by SCUP, NACUBO, APPA, and Coopers & Lybrand.

Stewardship Responsibility for Facilities

Facilities represent the largest single group of assets on an institution's balance sheet. It often does not show up that way because facilities are recorded at book value. If you were to look at it in terms of market or replacement value, it would be the largest group on any institution's balance sheet. It is larger than cash, and with a few exceptions it is larger than endowments; the exception might be Harvard University with a $5 billion endowment. Certainly student loan funds, another category of assets, or any other category of assets that exist on an institution's balance sheet are less than the replacement value of an institution's facility assets.

When you look in the aggregate, nationally, the combined endowments of colleges and universities are about $75 billion. Yet the replacement value of facilities is about $300 billion, representing about four times the aggregate value of all college and university endowments. Like endowments, they have been provided by donors, taxpayers, and students, and this makes facilities asset management an essential stewardship responsibility.

From the perspective of donors, when you look at institutions that have been around for several hundred years (or, for that matter, fifty years), there are donors who have contributed their funds to that institution with good intentions: to build a building or to construct some landscaping. There is a stewardship responsibility that the institution has to use those funds well. The donors are giving those funds to the institution in trust. Consequently, the institution has an obligation to its donors to manage their funds well, even if those funds have been converted into an asset, a facility. They have been given by taxpayers, particularly for state institutions. Taxpayers fund capital appropriations to public institutions and in some cases private institutions, and consequently each institution has an obligation to the taxpayers of the state or the country who provided those funds to exercise stewardship over those assets.

I would also argue that students have provided facility assets. For colleges and universities that have used debt to finance facility construction, very often it is student tuition dollars that go to service that debt. Consequently, students directly and indirectly fund facilities. So you have an obligation not only to your existing students who are paying for those facilities, but also to future generations of students to maintain those facilities well. The stewardship responsibilities of an institution should be directed at the assets, but there should be an obligation to the variety of constituencies who provided those assets to the institution.

Facility assets also depreciate. A simple notion, but it

has not been until recently that the accounting profession for nonprofit organizations has decided to recognize depreciation as a cost of operations. Part of the problem that we face today can be attributed to this lack of recognition of depreciation. Again, there was nothing in the financial statements, specifically the balance sheet, that would indicate that facilities assets were being depleted. The notion of depreciation that says there's a cost of operation (namely the weardown of capital assets which should be recognized financially) would demonstrate to people that these assets are wearing down. But for years and decades there has been no such vehicle or mechanism on the balance sheet to indicate to governing boards, presidents, or others that the assets are being depleted.

Facility assets are also critical for the fulfillment of an institution's mission. Clearly you cannot have excellence in teaching without a good faculty, but it's also difficult for a faculty to be excellent in teaching if it doesn't have the proper facilities to support it. Similar points can be made for research and public service. For instance, when you look on the side of research, you find that college and university scientific equipment and facilities are substandard; only 15 percent of the equipment and facilities in colleges and universities is considered to be state of the art when it comes to scientific research. Fifty percent of it is deemed to be obsolete, at least in terms of current technology and cutting-edge activities.

So without adequate equipment and facilities, how can colleges and universities continue to provide the research support that our country and various companies in the world need to continue to prosper? Similarly, the public service requirements of many public institutions are predicated on the availability of adequate and appropriate facilities.

Facility assets also attract students. A Carnegie Foundation study of seniors in high school asked students what was the most influential factor in selecting a college. Sixty-two percent of them said the campus appearance was the most influential aspect. A lot of faculty moan and groan when they hear that, and probably rightfully so; hopefully, people select an institution based on the quality of the educational experience. The reality is that many institutions are selected on the basis of how they look. Consequently, you see institutions requiring students to come on campus for an interview. There is an equal balance to that: they want to get to know the student better, but they also want the student to see the campus.

To summarize this aspect of the presentation, the institution has an essential stewardship responsibility. This is a point I want to continually hammer home, because historically it has not been viewed as a stewardship responsibility. If it had been viewed in this way, we would not be in the pickle we're in. If endowments had eroded over the last thirty years at a rate commensurate with the erosion of facility assets, it would be deemed catastrophic. However, facilities have eroded at an alarming rate. What it represents is a lack of stewardship at many institutions. It's an ongoing cost of operations.

Facilities are mission-critical. This is self-evident; we need facilities for teaching, research, and public service. And

lastly, they are an important student recruitment tool. However, they have been allowed to deteriorate at an alarming rate over the last thirty years. As I mentioned earlier, the deferred maintenance backlog is currently about $60 billion and growing. That $60 billion is a 1988 number, and we are attempting to update that at the present time. What has happened over the last thirty years is a severe erosion in the functional and financial value of an important, and the largest, asset of colleges and universities.

The Funding Gap

There has been a rapid increase over the last thirty to forty years in the amount of facility space. It has grown about a half billion to about 3 billion gross square feet of space. You can look at the funding gap. In 1988, it was estimated that just for that year about $6 billion was required to maintain and renew facilities. That is not to eliminate a backlog of deferred maintenance. It was assuming that, if you did not have a backlog, what was the funding required for that single year to maintain some sense of stability and equilibrium. And in our survey, institutions said $6 billion would be required. Yet there was only about $1.2 billion available to meet that need.

I will compare a 1990 National Science Foundation study with the same study that was done by NSF in 1988 and the APPA/NACUBO/Coopers & Lybrand study that was done in 1988. For renewal and replacement spending in 1988, NSF estimated that for every dollar spent on renewal or replacement, there was another $3.60 that was deferred. Our own study in 1988 said that for every dollar spent, another $4 was deferred. Our study and the NSF study were very close. NSF released more data in September 1990 basically updating their study from two years before. What they found was that the deferral rate had increased, and that for every dollar being spent in 1990, $4.25 was being deferred.

What this suggests is that the rate of deterioration is increasing. If the problem is allowed to continue, it will be catastrophic for colleges and universities by the turn of the century and beyond. We basically suggest that facilities' functional and financial value is decreasing at an accelerated rate.

There are several causes to today's problem. Certainly the rapid expansion during the 1950s and 1960s contributed to the problem. There was an enormous emphasis on constructing new space and considerably less emphasis on taking care of what already existed. There was also the notion of construction quality. Again, the demand was high, and the buildings were put up quickly. The construction was solid for the near term back in the 1950s and 1960s, but the buildings were not really designed with materials of optimal quality that would last over the long run. As a result, many facilities began to age prematurely.

Toward a Conceptual Framework

I talked earlier about the notion of depreciation. There was no mechanism in place to recognize that these capital assets were

wearing down. Even more importantly, there was no conceptual framework. There was no model, no way of looking at the portfolio of assets in such a way that governing boards and presidents and other key policy makers in an institution would know what was happening. It's easy to look at the buildings every day when you walk on campus and see that the library is still standing and the classrooms are still standing, but behind the walls things were happening. Things were deteriorating, and there was no systematic way of monitoring and evaluating what was happening. Consequently, the problem continued to be hidden until we reached the situation we are in today.

When you look at other areas of financial management, there are many clear methodologies and commonly accepted practices in place for other assets and other activities. If you look at the purchasing processes at your own institution, you'll find that some of them are cumbersome, some of them are well controlled, but often there is a variety of steps that must be taken before you can purchase an item needed by your department, say, for over $1,000. It may require three to five signatures. There are clear methodologies for managing commodities, for bidding various commodities and contracts, and there is a process in place around the notion of purchasing. Similarly, many of you have position control, which will control the number of employees and the number of budgeted slots that are available at an institution. There is a body of knowledge and a methodology in place to control the number of people who work for an institution. And I could go on in terms of accounting controls and other information bases and all the various policies and procedures that your institution may have to manage its finances and its assets.

However, there is very little in place from a financial perspective for facilities. There are no standard models, there are very few critical indicators. How do you know when your facilities are in good shape or poor shape? What indicator should you be looking at to make that determination? What decision support systems are in place? What kind of models can we apply to look at the repercussions of funding or not funding facilities, or funding facilities at a particular dollar level? What does that do to our facilities in the long run if we fund at X versus Y?

There is really no common approach. You go from campus to campus, from institution to institution, and there are various approaches taken for managing facility assets: some good, some bad, some comprehensive, some skimpy, but each institution deals with it in its own unique way. The lack of uniformity or commonality between institutions makes it difficult to set up benchmarks to get comparative indicators from campus to campus.

For example, typically an endowment represents a diverse group of assets and can represent high-risk real estate investments, investments in the equities of blue chip companies, or in the bonds of blue chip companies. There is a variety of investments an institution might avail itself of in managing its endowment. The overall goal is to allocate the assets between equities, bonds, and other activities to balance the risk. The institution wants to exercise prudent management over those

assets to make sure that the risk is reasonable and that the return to the institution is somewhat predictable.

Given the risk, a combination of asset allocation policies and formal spending rates, most institutions have adopted a formal spending rate that is typically based on a three-year rolling average of the market value of the endowment. Even though the endowment may yield, in terms of income and appreciation, 11 to 12 percent, an institution may decide to spend only 4.5 or 5 percent of that, reinvesting the rest in the endowment for future years so they can maintain the purchasing power of the endowment. You want that endowment to have as much value ten years from now in terms of the income as it does today. Consequently, the spending rate is a tool for managing that. Spend only a portion of what you earn, put the rest into the endowment to grow for future years.

Facilities, I would argue, are also a diverse portfolio of assets. We need for facilities to define equilibrium, and by that I mean, what is the balancing point that will maintain the functional and financial value of facilities over the long run? How do you maintain the purchasing power of your facility assets? That requires a careful balancing of a variety of different factors. But if you look at the facilities of any campus, it ranges from athletic stadiums to arenas to libraries to classrooms to office buildings to laboratories--it's a city within a city. There is an enormous amount of capital tied up in those facilities, and each of those facilities has differing needs. There are different types of wear and tear, different types of investments that need to be made, and each has to be viewed as part of an overall portfolio in facility assets.

You need to calculate a reinvestment rate, which is akin to the spending rate of an endowment. How much do we need to put back into facilities on an annual basis in order to maintain equilibrium? How do we maintain the purchasing power? So I would juxtapose the spending rate with the reinvestment rate.

Facilities are also an ongoing cost of operation. Consequently the funds for reinvestment need to be drawn out of the operating budget to a large degree. They should be recognized as a cost of operating the institution. They require ongoing assessment just as the endowment portfolio does; you look at market conditions, you reallocate your assets. Facilities require ongoing assessments in light of the institution's mission, strategic plans, its overall plans--and those plans change periodically. How will facilities interact with the overall plans of the institution and provide support for the mission and objectives of the college or university? Again, like the endowment, it's a stewardship function.

If you look at the board of trustees at any institution, there is an investment committee, whose members spend an extraordinary amount of time making the decisions about who will be the portfolio manager, how will we allocate our assets, how much should our spending rate be. They are exercising stewardship over those assets. If there is a buildings and grounds committee (which many institutions do not have, but when there is), they are not often dealing at the same level as the investment committee. They are looking at lists of projects, they are

looking at competing needs in many cases, but very rarely are they looking holistically at the facility asset portfolio, primarily because the tools and the methodology to do that are not in place.

Just to compare again the endowment and facilities, the goal of the endowment is to maintain the purchasing power of the endowment over the long run. With facilities, you want to maintain their functional and financial value to the institution over the long run. The endowment uses a specific spending rate as a means to make that happen. But with facilities, to maintain their functional and financial value, you need to have a predetermined reinvestment rate.

Managing the Facilities Portfolio

How much do we put back into our facilities on an annual basis? Again, with endowments you are managing a set of diverse assets. The same can be said for facilities, and just financially to compare them again, the market value of endowment assets of all colleges and universities is $75 billion, perhaps $80 billion. On the facilities side, it is $300+ billion. Yet when you compare the analytical rigor and the methodologies that are in place to manage the two different groups of assets, endowments clearly win. The facilities side, at least from a financial perspective, does not have the analytical framework to effectively manage them as a portfolio of assets.

One of the fundamental reasons for that difference has been that the endowment assets provide revenue, so it's important to the institution to make sure that the revenue stream continues and is predictable. Facilities assets incur costs; they do not spin off revenues. Although they are both a set of assets, one spins out revenue, the other one incurs costs. I think for that reason people have been less structured and less rigorous in analyzing how to manage the facility asset. However, as assets, both are essential. You need the endowment income to support the operations of the institution, and you need the facility assets to support the operations and mission of the institution. So it boils down to an issue of asset management, as opposed to whether or not one spins off revenue or consumes cost.

In looking at facility portfolio management, there are four basic points that need to be made. First, we need to establish a meaningful baseline of data. We need to understand what is in the portfolio, what the conditions are, and what the needs are, and pull that together in a comprehensive data base. Many institutions I've been to, when you ask them how many buildings they have, they're not sure, or how many gross square feet they have, they're not sure. They can account for every nickel and dime in the endowment, or they can account for every nickel and dime in cash that's being managed at a particular point in time, but they cannot tell you how many buildings they have.

Second, we have to begin to estimate short- and long-term renewal needs. The short term will basically be identifying what the deferred maintenance backlog is and trying to come up with a reasonable plan for minimizing that over perhaps a three- to

five- or six-year period. The longer-term renewal needs will be focusing on individual building components, using life cycle costing techniques. You want to have both short- and long-term renewal needs.

Third, you want to put in place some decision support model that will enable you to ask questions like, "If I spend X dollars on my facilities, what will facility conditions be like at the end of five or ten years?" Or, conversely, "If I want my facility conditions to be X, how much do I have to spend to get to facility condition X?" There are arithmetical models that can be used to begin to calculate some of that.

Fourth, you want to systematically report on the portfolio of assets. You want to report to line managers, senior managers, and to the governing board. There is a variety of reports in varying levels of detail that can be provided to different management levels and the governing board to give them the information they need to make management or policy decisions about the asset portfolio.

The Inspection Process

In discussing the inspection process, I will be drawing from a monograph, Managing the Facility Portfolio, that is currently being prepared by NACUBO. It was authored by myself and three individuals from Applied Management Engineering in Virginia Beach, Virginia. The methodology I am going to spend some time talking about is disclosed in that monograph.

What you want to begin to do is get a fundamental inventory of what is in the portfolio. You need to define that portfolio in basic terms. What is the building name? What kind of gross square footage does that building have? When was it built? What type of construction is it? What is its functional use? (This can be as broad as, it's primarily a classroom building that also has some offices in it; then define it as a classroom building.) How many floors does it have? What is its current replacement value? (This is one of the most important aspects. What would it take to reconstruct this building today?) What is its location? What are some of its uses? This is just some very basic baseline data about the buildings.

Going through the inspection process--and there is an elaborate mechanism that should be put in place when you inspect facilities--there are time estimating guides by facilities type that can be availed saying how long it will take to inspect the facility. What you want to begin to do is systematically, component by component, floor by floor, identify the problems that exist in the building. You want to do that probably with a team of people, either using an outside contractor or, to the extent you have the capability internally, assemble your own group of people to look at and inspect the facility. They need to be trained in the various methodologies that need to be put in place. There are forms and other types of data collection instruments that can be provided to them.

You begin to identify the problems and deficiencies, and to specify the corrective action that needs to be taken for a particular deficiency. What is it going to take to fix it? You

want to begin to provide the location data--where is it? You want to begin to quantify it in terms of dollars. What do you estimate it is going to take to undertake corrective action? Then you want to begin to establish priorities. Not all problems are equal in priority.

There are several different priority levels. The first priority you assign will be a priority 0. These problems need immediate correction; perhaps it is a threat to life or safety or a fire hazard, or some fundamental problem that needs to be immediately corrected. A priority 1 suggests that this is an important problem but it can be dealt with within a year or so. Priorities 2 through 5 can be delayed for two to five years (you can develop your own time frames for some of these). It is something that we need to deal with, it's not an immediate problem, but it is something we should address by next year or the year after that. By assigning priorities to the deficiencies, at least you begin to establish a hierarchy of what needs to be done when.

You then want to begin to assess the data. This provides a basis for long-term funding needs. It enables you to develop short- and long-term plans for dealing with the problems. We can also begin to compare facility conditions. How does building X compare to building Y, or building A to building Z? It gives you a baseline of data that you can then begin to manipulate. It enables you to develop more precise cost estimates for future funding requirements. It improves communications internally. People can begin to talk about the issues more dispassionately and in a more structured format, and again you can begin to develop priorities.

What often happens is that most facility condition inspections and audits stop after the formulation of the priorities. It is a very difficult process, particularly for a large institution, to sort through a long list of needs. About six months ago the chief business officer of an institution called me up and said, "Our facilities managers have gone through and they have documented the problems in the buildings. Will you take a look at this report?" I said, "Sure, send it along," and in the mail about two days later I got a computer report that was about 1,000 pages thick. It was lists and lists and lists of projects. I was sitting there saying, "I have absolutely no idea how to even begin looking at this report." It had been sorted by priority to some degree, but I was having an enormous amount of difficulty knowing where to start. How would you begin to assess this data in a meaningful way? How does one building compare to another?

Creating a Facility Condition Index

One way to begin getting at that is to establish and create a facility condition index (FCI). It is a very simple calculation. What it amounts to is the cost of the deficiencies that you have uncovered by going through an inspection divided by the current replacement value of the building. If the building has a replacement value of $1 million and it has a $50,000 set of deficiencies all over the building, the FCI is about .05, or 5

percent.

But what does it mean? Based on at least some of the work that AME has done and some of the work I have seen done, if the facility condition index is under 5 percent, generally the condition rating on the facility can be deemed to be good. Now this is a subjective indicator at this point. Again, because there are no commonly accepted techniques and methodologies, so it is difficult to say with certainty that these are exactly what they should be. But if it is between 5 and 10 percent, the building conditions are considered to be fair. If it is over 10 percent, building conditions are deemed to be poor. It is one way of at least looking at a particular building or looking at a particular campus and getting some sense of the value of the deficiencies relative to what it would take to replace this campus.

You then want to sort the data by building, by space type, by facility age, by FCI, and by building component. How bad is the deferred maintenance backlog? Again, using the FCI, if somebody came to you and said, "We have a $5 million backlog," FCI helps you determine if $5 million is good or bad. In one example, the replacement value of the assets is $200 million, so $5 million is a 2.5 percent FCI, which is really in the "good" range. Conversely, an institution with $20 million replacement value and a $5 million backlog has a severe problem because the FCI is in the range of 20 percent, or poor. So again it gives you some sense of the relative relationship between the problems and the replacement value.

If the institution's strategy is, for example, to increase or improve research over a period of time, or to improve the quality of residential life on campus, you can begin to see at least relatively where the problem is or what your need is relative to other uses of facilities on campus. Again, it compares them in terms of the condition that they're in.

You may decide that some of these facilities that are in the poor category are going to remain that way, but what we really want to do is move the marginal facilities up to the good category. Not everybody has the optimal level of funding, but at least you know what you have not begun. In other words, you know that you haven't made the investment here and you're going to forestall that for a period of three to five or more years. But it gives you some sense at least on a relative basis of what you might want to do.

You then want to begin to estimate your short- and long-range needs in terms of a deferred maintenance reduction program and a component renewal program. For the deferred maintenance plan, you want to identify and tabulate the deficiencies. Again, what you found when you went through the inspection process were the problems that exist in the facilities currently; in many cases, those are an accumulated backlog of problems that haven't been dealt with for a period of years. You want to begin to identify, tabulate, and organize them. You want to look at what kind of funding is available so you can begin to stage out a program over three to five, four to six, five to seven years--whatever the appropriate program might be for your institution.

Next, you need to develop some kind of preliminary plan

for taking on those projects and begin to document individual projects. Again, this is usually a three- to five-year effort. Any deferred maintenance plan must include ongoing component renewal, and what I mean is that it's not enough to fix historical problems over a five- to seven-year period. You have to recognize that the assets are also buried down in each of those five to seven years, so that eradicating a backlog should be done concurrently as an ongoing reinvestment plan to take care of the problems as those facilities continue to wear out and deteriorate.

Component Renewal

There are several key assumptions concerning component renewal. For example, we assume that the average life of a facility is 100 years. Now a lot of people will shake their heads at that, but basically what it's saying is that the foundation and the core structures of the facility are probably not going to wear out in fifty years. Fifty years is the typical life expectancy of a building, but the basic components of the building will probably last well beyond fifty years, and for purposes of this discussion assume that it will be 100 years.

Each building comprises a finite list of major components. It has roofs, electrical systems, heating and ventilating and air conditioning systems, flooring systems, and wall systems, and each of those components has a life expectancy. Those of you familiar with indirect cost recovery for sponsored research can employ the use allowance or component depreciation approach to determine this. It is the component depreciation approach that we are talking about here. Each building component has a different life cycle. The roofing system might have a twenty-year life cycle, the electrical system might have a twenty-five-year life cycle, and on up. I'm just making these numbers up, but each will wear out at a different point in time.

The entire building does not wear out at once. When they do wear out, not all the components need 100 percent replacement. The electrical system may not need to be entirely replaced, or the HVAC system may not need to be entirely replaced. For purposes of estimating component renewal, we use a five-year planning increment. It is extremely difficult and probably foolhardy to try to predict that exactly in 1998 the roof is going to wear out. It's probably more reasonable to say that a group of building components across the campus are going to wear out between 1995 and 2000--here is roughly the dollar expenditure that we're going to have to make during that five-year period.

What you want to do is collect basic data on each building component and then categorize each building by its type. You want to calculate the average useful life of each component. This could be based experientially on your own institutional knowledge and experience, or it can be taken from a variety of data bases that are available. You want to determine the average percentage of renewal. Is it going to be 50 percent of the electrical system? Is it going to be 25 percent? You can make some reasonable assumptions based on your own institution, the quality of construction, and the quality of the maintenance

program that has been in place to determine how much of the component will need to be replaced.

Next, the component renewal unit cost needs to be estimated. What is it going to take to replace an electrical system, or what's it going to take to replace an HVAC system? You want to determine the renewal periods to the end of the building life. If it's a brand-new 100-year building and the roofs are expected to last twenty years, then there are going to be five roof replacements over the life of the building.

Lastly, you want to compute the cost of renewing all components by building and for all of the buildings across the campus. Again, what you are looking for are long-range capital budgeting estimates that will help you understand what your future funding requirements are going to be.

A recent municipal facility inspection of a public library indicated a $1.1 million deferred maintenance backlog; as a result, there is some staging that has been done by priority, by use, and by facility type to develop a plan. This is a one-year plan, but what you typically want to see is a three- to five-year plan of a similar nature. This example shows that for each of these major components--windows, floors, and ceilings--between 1990 and 1995 the roof is going to require $19,000, the floor is going to require $33,000 and so on, until it runs out in the year 2090. In the year 2050 or so you see a very, very large number. At this point in time many of the major building components reach a critical juncture and all reach a major end of their life cycle, so there is a very large spike in the year 2050 that the city is going to have to budget for in terms of its public library. The city has developed estimates in five-year intervals of what the public library is going to require over the next fifty to sixty years.

Another example involves a university that developed essentially the same kind of analysis except that, instead of by component, it's taking all of the buildings on the campus and simply saying that between 1990 and 1995, $731,000 will be needed for component renewal during that five-year increment. On average, the institution needs to tuck away about $358,000 on an annual basis. But the component renewal is not a steady state. There are many, many ups and downs and the funding has to be fairly spiking, but what you want is a steady investment rate or reinvestment rate that in some years will provide more than the facilities require for investment and you can save that, either in the plant fund or quasi-endowment, so that when you hit a year with a large spike the funds are available to meet your needs. That way you at least have some degree of steady state funding.

Decision Modeling

We will get back to the facility condition index and look at backlog projections and funding decisions. The questions you might typically ask include: If funding is X dollars for some number of years, what will our backlog be at the end of the period? What will our facility condition index be at the end of a ten-year period? Or, we want to get the facility condition index to 5 percent in ten years. How much do we have to spend, given

where we are, to get to 5 percent? It's an interesting question to ask and not entirely difficult to answer, but it takes some number crunching to do it.

In both cases you have to consider the inflation rate, the rate of plant deterioration, and the backlog deterioration rate. We're all familiar with the inflation rate. The plant deterioration rate says that parts of the plant are wearing out on a systematic, predictable basis year after year. That way we know that the plant does deteriorate as it ages. The backlog deterioration rate suggests that if you have a backlog of deferred maintenance, there is an accelerating rate of deterioration that might be in excess of the plant deterioration rate. By that what we're talking about is if you have a problem with your roofing systems, and you haven't dealt with it and those roofing systems begin to deteriorate and water begins to seep into the building or other water-related problems occur, it begins to compound. The backlog deterioration will accelerate at an increasing rate. Also, you want to factor in the rate of plant growth.

The variables that you want to begin to manipulate are several. You want to focus on the current replacement value and the projected plant growth rate. How much does the plant expect to grow? Now you may grow at zero, if no future growth is anticipated. What is your current backlog of deferred maintenance as derived from your facility condition inspection? Again, that is an important number, and in this case guesstimates are not very useful. You really do need to go out and get your fingernails dirty and fully understand the condition of the existing plant.

What is the backlog target? What do you expect or want the backlog to be? What are the funding levels? How much money are you spending on an annual basis for facility renewal? What are the inflation rates that you choose to assume? What is your backlog deterioration rate? What is your plant deterioration rate?

What you are trying to get at here ultimately is the reinvestment rate, and that is the notion I was talking about earlier. The reinvestment rate is essentially the same calculation as the facility condition index, annual funding divided by the current replacement value of the plant. So if you have a $100 million replacement value for your plant and you were putting in 3 percent, then your reinvestment rate would be 3 percent. A relatively simple calculation. Again this is getting back to the two questions, if we spend X for N years where will we be in terms of our facility conditions?

If you run the equation it looks at various reinvestment rates, so that if we spend at 3.5 percent of current replacement value, you project that the backlog at the end of five years will be $799,000, or 2 percent, which is a very good place to be. However, if you spend at only 1 percent of current replacement value, your backlog moves up to 10.8 percent. What this shows you is the relative impact of various reinvestment rates on the future condition of facilities over a period of five years.

If you know your current replacement value and you know the current backlog of deferred maintenance, you can begin to do

some modeling that will tell you that, although you can only afford to spend 2 percent of current replacement value, we should have an FCI of 6 percent in five years, so at least you know the effect of a particular decision. My sense now is that many institutions spend what they have or what they can really afford to spend but often don't know what that's going to provide them in terms of overall facility conditions over a period of years. This is one way to begin to model. Now again, there are many assumptions that you can make and variables that you can manipulate. Ideally you want to be as practical and realistic as you can be.

The rule of thumb that many people have used for facility reinvestment rate has been about 1.5 or 3 percent of replacement value, but the analysis suggests that really 2 to 2.5 percent may be the floor for that rule of thumb, that 1.5 percent may be too low. A number representing 2 to 2.5 percent will prevent further deterioration of an existing backlog of deferred maintenance and facility conditions, whereas 1.5 percent may contribute to further deterioration. Certainly it is better than zero, but it won't arrest or stabilize the situation.

Reporting

Reporting, as I mentioned earlier, actually occurs on three levels: the board, senior management, and line management. Each level has differing needs for detail, as each has different responsibilities and decisions that need to be made; consequently, the information can be summarized to varying degrees depending upon the particular audience.

If you have adopted a portfolio approach to facilities management, at a minimum you want to take them through the basic components of what you are trying to accomplish--how the equations work, the decision modeling, what the facility condition index is--and begin to take them through the conceptual framework that's being applied in your approach. But in terms of just orienting a board or senior management to existing conditions, you probably want to look at just historical data. For example, so many gross per feet were built in 1910, and take it forward to 1980. This can take the form of a simple bar chart.

You can also look at historical expenditures for maintenance and repairs and renewals. You can begin to see an increase in the backlog of deferred maintenance, and simple graphics and pictures will be useful to orient decision makers as to what the instruments are that were backlogged. You could then prepare a simple summary that would show the total number of facilities, the replacement value of those facilities, and the square footage. You also can show facility condition indexes by age of building, and a simple pie chart can illustrate these numbers.

Achieving Equilibrium

What is the right number? Is it 10 percent, 5 percent, 1 percent? I would suggest to you that there is no one right answer. Ideally, zero is something that every institution would like to

strive for. It's probably impractical to strive for zero, just because you always want to have some small amount of backlog so you can begin to organize and stage the work in a cost-effective manner. You want to at least have some minimal level of backlog for purposes of organizing and focusing on it. The question, however, is how much should you be investing? What is the reinvestment rate and what is the FCI that you should strive to achieve?

Your objectives could be several. One might be to stabilize the existing situation. Just what level of investment do you have to make to arrest an accumulating and an increasing backlog of deferred maintenance? And if you're currently at 8 or 9 percent FCI, how much do you have to spend to at least stop it there and not let it deteriorate further? That may be one strategy. Another might be that you're at 6 percent or 7 percent, so how do you maintain that level of backlog, similar to the stabilization approach. If you're happy with 5 percent or 4 percent, how do you maintain that? What is the level of investment that you need to make to maintain that FCI? And the other might be if you're at 6 percent or 7 percent and want to get to 4 or 5, how much do you have to spend to get there and to maintain that level?

Equilibrium will be defined by each institution's unique circumstances, but it's important to have some definition at the institutional level for the condition that facilities should be in. Without that it is very difficult to develop a funding strategy, to calculate a reinvestment rate, and to sell this persuasively to decision makers, and it's important to do that for purposes of overall planning and funding strategies.

People often ask, how are we going to pay for this? It is always an interesting question. There are two basic sources of funding when you really get down to it. There is debt and there is equity. There are a variety of debt instruments available out there, and each of them ultimately comes back to the institution because the debt service payments have to be made by the institution. There may be some attractive ones with attractive rates. There are general obligation bonds, revenue bonds, and other options.

It is unlikely that there is going to be any money coming from the federal government over the next decade to deal with this problem, and increasingly as state budgets become constrained, many institutions are not going to find the dollars they need coming out of the state to fund these needs either. Increasingly, institutions are going to have to look internally to generate some of the capital that they need. Whether you are doing fundraising or charging use allowances for facilities, whatever that source of revenue from the current fund of operations is, that's where you are going to have to look for it.

It's a difficult situation for most institutions, because it requires making difficult choices. More and more institutions are going to faced with these choices as the 1990s continue. For instance, there is going to be a drain on the number of faculty. A shortfall is predicted, particularly in the latter part of this decade, in the number of qualified faculties that are going to be available. This ups the cost of faculty, due to supply and

demand. There is a host of choices that need to be made on access to financial aid. And as you go forward, increasingly facilities are going to become part of those choices.

The 1990s are going to be a time of constrained resources. There are going to be fewer resources and greater and greater competition between schools on the revenue side. Private institutions have been feeling a lot of public pressure and a lot of rhetoric directed at them on the notion of tuition pricing. Federal research funding is going to be more scarce than it has been in the past, and there is going to be more and more competition for it. Charitable giving has been up and down over the last several years. While it's not predictable at this point as to what might happen in future years, certainly the demographic factors that have been heralded for so long will continue to affect colleges and universities and continue to affect agencies.

State appropriations are being squeezed now in many states throughout the nation. Endowment spending is going to become increasingly under pressure, given market performance in the broader financial markets. This will put pressure on many institutions to perhaps try to increase their spending rates. This is not the best kind of stewardship in many instances, but if the budget is sufficiently constrained they may have to do so.

The capital renewal/deferred maintenance issue will loom large for many institutions. As I mentioned, only 15 percent of scientific equipment at colleges and universities is deemed to be state of the art. Fifty percent is deemed to be obsolete, and maintaining and acquiring that equipment will put further pressure on institutional budgets. Debt and debt capacity will become a greater concern as more and more institutions are going to be looking to the debt market to finance a variety of activities.

Tuition Pricing

Paying for a college education is going to be the most difficult issue of the 1990s. Tuitions have been increasing at 8 to 9 percent, and in many private institutions it's not uncommon to see a 10 to 12 percent increase in tuition and room and board prices on an annual basis. I have a professional interest in that because I work with colleges and universities, and I also have two close-to-my-heart personal interests in tuition pricing.

The first of those is my daughter Allison, who is five years old and will enter college in the year 2004. The second is Christopher, who is 16 months old and will enroll in college in the year 2007. For Allison, if I take a mid-priced, private, liberal arts college in the northeast and take the historical growth rate in tuition, room, and board and run it out, it will be in the area of $200,000 for an undergraduate education. For Christopher it will be about $225,000, and all told I'm looking at a bill of about a half a million dollars for the two of them.

This is a troubling issue that is going to put a lot of pressure on institutions. The trick will be maintaining some sense of financial equilibrium in terms of the institution's ability to enact changes in revenue and maintain that balancing

act. The same holds true for endowment performance, and facilities management--how to maintain some sense of equilibrium and stability in the overall financial performance of the institution.

Where are we currently? Looking again at the facility condition index, the cost of deficiencies divided by the current replacement value equals facility condition index. On a national basis, we have a 20 percent FCI. The replacement value of college and university facilities is about $300 billion. The cost of deficiencies cited in our 1988 survey was estimated at $60 billion. Overall, given our earlier subjective ratings, that puts college and university facilities into a condition rating of poor. Now you can all look at own campuses and decide whether that's true of your individual institutions, but at least using the statistical data that we've been able to derive, it suggests that colleges and universities have a long way to go to upgrade the quality of their facilities.

Conclusion

It is imperative to get a baseline of data established that is meaningful to an inspection of a facility and to the compilation of a comprehensive information base. Out of that you want to begin to develop short-range needs for deferred maintenance reduction and long-range needs for component renewal, and build that into the modeling of various funding alternatives. What does a particular funding level mean in terms of facility conditions? You begin to model and play with those to understand the impact of various funding streams on facilities. Then you can begin reporting on a systematic basis to boards, to senior management, and to line managers. Out of that will come a funding strategy.

State Issues in Capital Management

Brenda N. Albright
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Last week we finished the 1991-92 capital budget for public institutions in Tennessee, and presented it to the higher education board. The hardest aspect about my state-level finance responsibilities is putting together a capital budget, because projects from twenty-four campuses must be evaluated and ranked. What project is to be number one? What project is to be number two? What project is to be number three?

I want to describe three projects that were requested by campuses because they are good examples of state-level policy issues.

The first project is renovation of a university campus. The campus has been neglected; buildings are poorly constructed, poorly designed, and poorly maintained. This project costs $20 million.

Project number two is at a growth campus. A two-year technical college in Tennessee has tripled its enrollment in five years. Everybody want to enroll because they can graduate from the college and get jobs. Classes are scheduled from 7:00 in the morning until 10:00 at night. Students are being turned away. A major campus expansion is needed to address classroom needs, faculty office needs, and a library.

The third project is a College of Law Building. The existing facility does not function effectively. It is heard for students to get from one end of the building to the other. Beyond that, the accreditation society is on campus. The press has spoken to the accreditation team members and a newspaper article

quotes accreditation team members as saying that, "the building is the worst in the country."

How to set priorities is a major issue facing state-level policy makers. Tennessee and many other states are moving renovation to the top of the capital priority lists.

Why? In response to needs and in response to the reality that renovation is now a public issue, in part because of the work of APPA and NACUBO, board members are more aware of renovation needs.

Renewal is politically popular -- Governors, legislators, and board members like it because it's consistent with their belief that higher education institutions and leaders should focus on taking care of facilities.

Some state have even considered policies of not constructing new facilities until needs are met. For example, in Texas last year it was suggested that there be no new expansion until each institution met 70 percent of its deferred maintenance needs. Texas is a good example of a state that has put significant resources into renewal and renovation.

Tennessee became interested in renovation about fifteen years ago and established a statewide audit system. In selling this system to the campuses and to the presidents, we found about a third very supportive, a third neutral and a third not supportive. Why? Renovation was seen as competing with new construction for limited resources. Another concern was that by funding renovation for campuses that had not maintained space, by allocating adequate resources the state rewards poor management. Although not all campuses were supportive of capital renewal fifteen years ago, most are today. Capital renewal maintenance has made a difference.

Some states have even put capital renewal programs into law. For example, Arizona has a statute that defines the amount of funds that should go into

renewal. Despite that, those of us in the public sector as dependent upon what happens to state tax revenues. Tennessee's program has been very stable with relatively good funding over fourteen years now.

Growth is an issue that many states must address. In Fall 1990, enrollments in Tennessee's public sector were up by about 5 percent, and in 1989 they were up by 6 percent. Tennessee, like most states, uses space standards to determine new space requirements. However, most of the space standards were developed in the 1960's and should be updated to reflect technology and other changes taking place on campus.

For example, many space standards focus on scheduling classes from 8:00 a.m. to 4:00 p.m. One two-year college in Tennessee schedules most classes after 5:00 p.m. because 70 percent of the students work and are part-time. Many campuses are very poorly configured. Frequently, we find numerous classrooms that accommodate forty students although most classes are limited to twenty-five students or less. When we use space standards, the configuration of the campus should be considered.

When major expansions are proposed, ongoing operational costs are also included. Ideally, future renewal costs should also be presented.

A difficult issue facing states is functionality. Many facilities are out-of-date from technology and program delivery perspectives. In some cases, it is more cost effective to tear a building down than to renovate it.

Research space is an area of focus for many states. In the past five years, several states have focused on upgrading institutions in the research area. Tennessee initiated a major program to attract new faculty, its Chairs of Excellence Program. The legislature has appropriated $43 million to this statewide endowment program. State funds are matched on a dollar-for-dollar

basis. The program is designed to attract outstanding faculty and upgrade the instruction and research program.

The institutions have been extremely effective in raising funds. Space is a problem. When one distinguished faculty member is hired, he or she is accompanied by a team, similar to a small business. Rather than space for a faculty office of 100 to 200 square feet, the research suite may consist of 15,000 to 20,000 square feet.

Many states are focusing on facilities master planning. Within the past five years, several states have adopted policies that campuses must have up-to-date facilities master plans. In some instances, if a campus wants a new project funded, then an up-to-date master plan must be completed.

On the operating budget side, most states have had major funding reductions. We can expect further reductions reflecting recessionary times. An issue states and campuses must address is whether maintenance and operation of physical plant budgets should be cut. Tennessee's position is that these budgets should not be cut any more than other parts of the budget.

For 1990, parking seems to be an important capital issue. When I was on a campus last week trying to find a place to park, I understood. Finally, I went to the parking garage and I circled around on the very bottom level. I found the last parking place and got out of my car. A student approached me who obviously had "lost" his car. He asked, "Lady, can you tell me which way is up?"

Which way <u>is</u> up? When faced with today's capital issues at the state and campus levels, the way "up" is through leadership. We must find those leaders who will be advocates for the needs of higher education and who will be good managers to demonstrate our effectiveness.

Policy-making Issues

Frederick R. Ford
Executive Vice President and Treasurer
Purdue University

It is important to recognize that we are all organized differently. I have spent my entire career with Purdue University and so my experience, as far as capital management is concerned, is primarily reflective of those years at Purdue. I also have a lot of opportunities to visit other colleges and universities and my hope this morning is simply that the things I have learned will spark ideas and will help you develop plans to better manage the facilities on your campus, within your own environment.

There are no magic answers on how best to manage facilities and there is no tooth fairy that funds facilities, either new construction or renovation.

In managing facilities, I think that you must start with the board of trustees and the president. It is very important that these people understand and appreciate facilities. That sounds like a simple thing, but it really is not. Sometimes we assume that trustees have certain priorities or the president has these concerns, and we do not do enough to educate them. At Purdue we

have a Board of Trustees Physical Facilities Committee with which we review all major projects in various states from planning to construction and renovation. We send them information about what we are doing so that they can feel like they are a part of, and an ally for, facilities management. The same thing is done for the president.

Too often, I think that the aesthetics of a building instead of how it will be operated and maintained, drives the design and operation because the architect wants to build a monument. It is important to get the operation and maintenance concerns well placed in the facilities planning process for new construction and major renovation. It is our responsibility to see that this is done because the architects leave town once the building is done, and we are left with the responsibility to maintain and operate the facilities.

It is very important to have a well-articulated set of policies and priorities that are adhered to. Business officers and physical plant officers are the ones that have to address these. Furthermore, you cannot just do it once, forget about it, and go on to something else.

Also important are the relationships that we have on the campus, and I want to discuss the relationship between the business officer and the physical plant officer, and then put it in a broader context with the academic side of the house.

I think that it is important that the physical plant officer (at Purdue the title is vice president for physical facilities) reports to the chief business officer. It is also important that

the chief business officer understands facilities and the impact of the facilities on the overall success of the university. Particularly at a school like Purdue, where engineering, science and technology are a big part of our programs, facilities are extremely important.

In my judgment, the most important ingredients for a successful, high-quality institution are, number one, the faculty. Without question, it is clear that you must have an outstanding faculty or you cannot have a high quality institution. Number two are the facilities. Referring again to the engineering and science aspects, you cannot recruit or retain outstanding faculty unless you have up-to-date, modern laboratory facilities. They cannot succeed in their careers if they do not have the tools to do their trade. The combination of those two ingredients--faculty and facilities--creates what you might call "the environment for learning." It is that environment for learning that we are trying to provide in the university setting.

The third ingredient is students. You must have quality students if you hope to have a high-quality institution. It has already been mentioned that a great number of prospective students are attracted to the campus by its appearance; whether it is well maintained; whether it is clean and orderly. Facilities are critical.

Finally, there are the support operations: the business office activities, purchasing and payroll, personnel, and so forth. They are there to make possible the operation of this environment for learning.

As I am sure many of you are aware, typically business officers come from an accounting background. They are likely to have good training and experience in generally accepted accounting principles, audits, budgets, but they may not have as much facilities background. They may have never been on a roof, for example. It is important that they, too, get an education and understand thoroughly the nature of facilities. One of the things that has helped me is my undergraduate degree in mechanical engineering. While I am woefully out of date at this point--my engineering staff reminds me of that frequently--the background itself has helped me understand facilities problems and concerns and how to solve them.

It is also important that the chief business officer understand the investment side of facilities. Business officers and trustees at least think that they understand investments, and it is important to put facilities in that context. The replacement cost of the facilities at Purdue currently is $1.9 billion. On the financial side as a public institution, we do not have a large endowment; it is $150 million. Contrast and compare a $150 million endowment with a $1.9 billion investment in facilities. That is more than a factor of 10. I am sure that if you just talk to people like trustees and the president, they probably would not think of it in those terms. It is important to remind them from time to time, particularly as you are setting budget priorities, what those relative values are.

I just took a quick look at our current budget for West Lafayette. We are spending about $60 million a year on operation

of facilities. That includes all the utilities, maintenance, police and fire, etc. All of the administrative functions come to $32 million, so roughly twice as much money goes to facilities as all the other administrative functions.

Now, why is it that I think it is important that the physical plant officer report to the chief business officer? First, generally it is the chief business officer that puts together the budget. The chief business officer also controls the balance sheet, reserves, and various accounts that are established. By virtue of that, he or she can be extremely helpful in addressing the problems of facilities management.

The second reason is that the chief business officer knows where the gold reserve is buried. If the chief business officer is at all smart, he or she has carefully placed it in the deepest, darkest part of the accounting swamp that no one else knows about. He or she also knows of the various other sources of funds that can be applied to building maintenance and renovation.

You need to recognize also that much of what physical plant needs for special maintenance and special renovation activities is nonrecurring money. The business office people here understand perfectly, that nonrecurring money is generally easier to come by and easier to set aside and use for some of these things than it is to allocate a recurring stream of money. Of course, the money that is buried in the swamp is nonrecurring money.

Chief business officers are also the ones who do the debt financing of facilities, and it is important that they understand what it is they are financing and not just their financing activity.

The chief business officer is most likely to have final authority on a variety of financial decisions relating to facilities simply because the president, although interested in all this, does not have the time to get involved other than with the major kinds of decisions, like new buildings and major renovations. That leaves literally thousands of other decisions. The chief business officer cannot make all of those decisions either, and I do not mean to imply that he or she should. But if you were to sort out a hierarchy of these decisions and set up programs that can provide funding, the chief business officer would provide the financial side of that equation.

It is important also to have certain philosophies such as the importance of good management. Purdue has a long-standing reputation as an institution that puts a high priority on management. I have been fortunate to grow up in that environment under three different presidents. The first one that I started under drummed into our heads "excellence" in everything that we did and the importance of good management. Even though many times the faculty do not give much priority to management and some disdain good management when you practice it, it is still important to the long run success of the institution.

It is important to have a careful determination of needs, with input from lots of people. Then that input has to be

married to financial sources. There are lots of people who can tell you what needs to be fixed and what spaces need to be renovated, but there are not many people who can tell you where to get the money to do it. That is where the chief business officer is in a position to bring these things together and make things happen.

Planning is something that is so important to physical facilities that we cannot stress it enough. We cannot spend enough time and involve enough people in it, and it needs to be done correctly. One of the things that I put into the definition of the correct way is the way you organize planning so that people are looking within their organizational boundaries. For example, I do not set priorities within the chemistry department. I ask the department head, who works with the faculty in chemistry to set the priorities there. On the other hand, I do not ask the people in chemistry to prioritize the allocation of funds between chemistry and electrical engineering. There is simply too much conflict of interest for them to make that judgment.

It is also important to have a team of people at the top who are working together toward the same goals. We spend a lot of time talking with the academic side of the house. In our institution there are two executive vice presidents: myself, representing the business office, physical plant, and housing and food services, and an executive vice president for academic affairs, representing all of the academic schools and the student services area. Space management is housed under that executive

vice president, and he and I, the space management people and physical plant people spend a lot of time talking about ongoing projects, ongoing master plans, and priorities so that we can keep everybody moving together in the same general direction.

Also important (perhaps because I have been at Purdue a long time) is having people that have a fairly long tenure. This provides the continuity, the understanding of the history, and the tradition of priorities of an institution that can be lost if there is too much turnover and too many new people. On the other side of the equation, new people frequently bring in new ideas, and so it is good to have some turnover.

Priorities, of course, are key to decision making, and certain kinds of priorities in our organization, and with me, are automatic. For example, repair needs are essentially always higher priority than renovation needs. It is more important to fix a leaky roof than it is to tinker with the office structure or something like that, which may make a building a little more efficient, but it will not last long if the roof falls in.

The use of low-maintenance materials is a high priority. Although this approach is more expensive in the short run, since we spend a lot of time focusing on the materials, the construction, and the design, making sure that we have taken the lifetime of the building into consideration, the costs are lower in the long run. In addition, we fight with deans and department heads a lot about the cost of renovation. They typically want to opt for the cheap solution, one that will get them through the period in which they are deans or department heads. I generally

opt for the long-term solution that may last through three or four deans.

Speaking of philosophies, I happen to be a devotee of participative management. I think in today's environment that it is extremely important, and as many of you know, it takes a lot of time to operate that way. A great deal of time is spent getting input. It also means that you need to reserve certain key decisions for yourself and make sure that they are, in fact, key decisions--the rest you delegate.

Let me switch now, just for a second, and talk about budget reductions, and one particular aspect of it that I think is important. A number of years ago, we quit trying to renovate entire buildings all at once. For example, there was a time when we cleared out the mechanical engineering building and spent $4 million renovating that facility, planning then to go on to something else. First of all, it is tough to clear out a whole building. Second, it does not serve very many people relative to the magnitude of dollars you spent. Third, it is difficult to prioritize a whole building. If you are renovating a whole building, you tend to do everything. You relight corridors, you may put down new floor coverings, and so on. In the whole scheme of the campus, these things are probably not nearly as important as some other renovation needs in other buildings.

We operate on the basis of master plans when we prioritize projects. We categorize these smaller project packages and things like fire safety, classroom upgrades, laboratory upgrades, window replacement, restroom upgrades, etc. We manage many

smaller projects and we have literally hundreds of renovations going on around the campus at any one time. Lots of different people are being served rather than just the people who happen to be occupants of one building.

One more comment in regard to budget reductions. It is very important to have multiple sources of funds. Getting back to the business officer's role, if the business officer controls the funds, he or she is in a position to identify multiple sources of funds. Operating budgets, operating budget reserves, balance sheets, year-end balances, gift funds--all these things are potential solutions to facilities renovation problems. It is a neat strategic puzzle to pull these things together, to marry the highest priority needs on the campus to various sources of funds and thus help offset the problems of budget cuts.

I have had great success identifying projects that I know are close to the hearts of deans in particular schools. I offer to match funding with them, and frequently they use some of their gift funds. Then they turn around and tell a donor, "Look at what I got for your money." Indeed, the donors are impressed that they can do that much. It provides a sense of accomplishment, it gets more work done, and it spreads my dollars farther.

Let me close with just one goal that I have: to leave my successor a better set of facilities than my predecessor left me!

Financing Options

David M. Cyganowski
Vice President and Manager of Higher Education Finance
The First Boston Corporation

I wish to address several broad areas in college financing: the environment, and the opportunities and strategies it brings to both public and private colleges and universities throughout our country. It is always useful to take a look at the market that we are talking about. I have included data runs to give you a feel for how big the higher education market is and the progress that it has made during the last few years.

Figure 1 identifies and quantifies all tax-exempt and taxable financings that have been completed by private and public colleges and universities. You can see that in 1984 we were in the neighborhood of $3.5 billion, and in 1990 we are heading toward $8 billion.

There are several interesting trends here. First, 1985 just sticks out like a sore thumb. The Tax Reform Act was passed in late 1985, and with it, unfortunately, came many restrictions on colleges and universities and their ability to finance on a tax-exempt basis. Fortunately, however, the colleges knew that the Act was going to pass and that it was going to be restrictive, and they completed significant preemptive financing in 1985. As a result, tax-exempt college and university financings ballooned up to $10 billion. What they did, as did many other issuers of tax-exempt debt, was finance in 1985 what they would have financed in 1985, 1986, and 1987. That is why you see this degree of falloff in 1986 and 1987.

Taking that aberration out, however, you can see steady growth from $3.5 billion in 1984 to $8 billion 1990. It is a growing market that investors feel comfortable with. We at First Boston expect no change in that level of investor comfort as we move forward into the 1990s. The 1990 volume of $8 billion represents, in terms of the total municipal market, about 6 percent of all municipal financing. Nearly 75 percent of that $8 billion was issued on behalf of public colleges and universities, state-supported institutions. Half of it, almost $4 billion, was issued by one authority--the Dormitory Authority of the State of New York.

Figure 2 takes a look at the market in yet a different way: negotiated versus competitive financings. The one constant in the market is that schools have taken advantage of a negotiated sale. That tells us that colleges have been in the forefront of innovative financing techniques. Negotiated sales as

Figure 1

Higher Education Market

1984 to Present

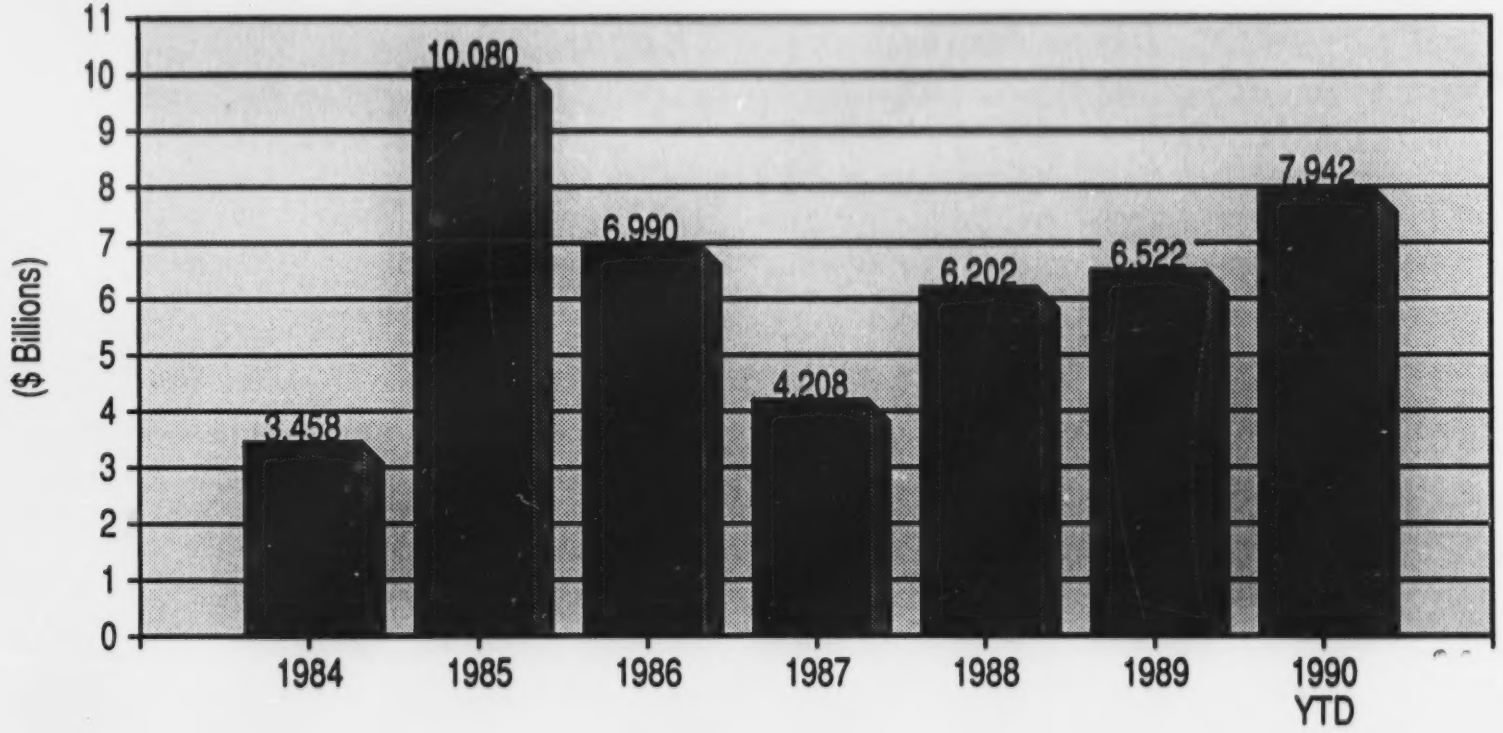
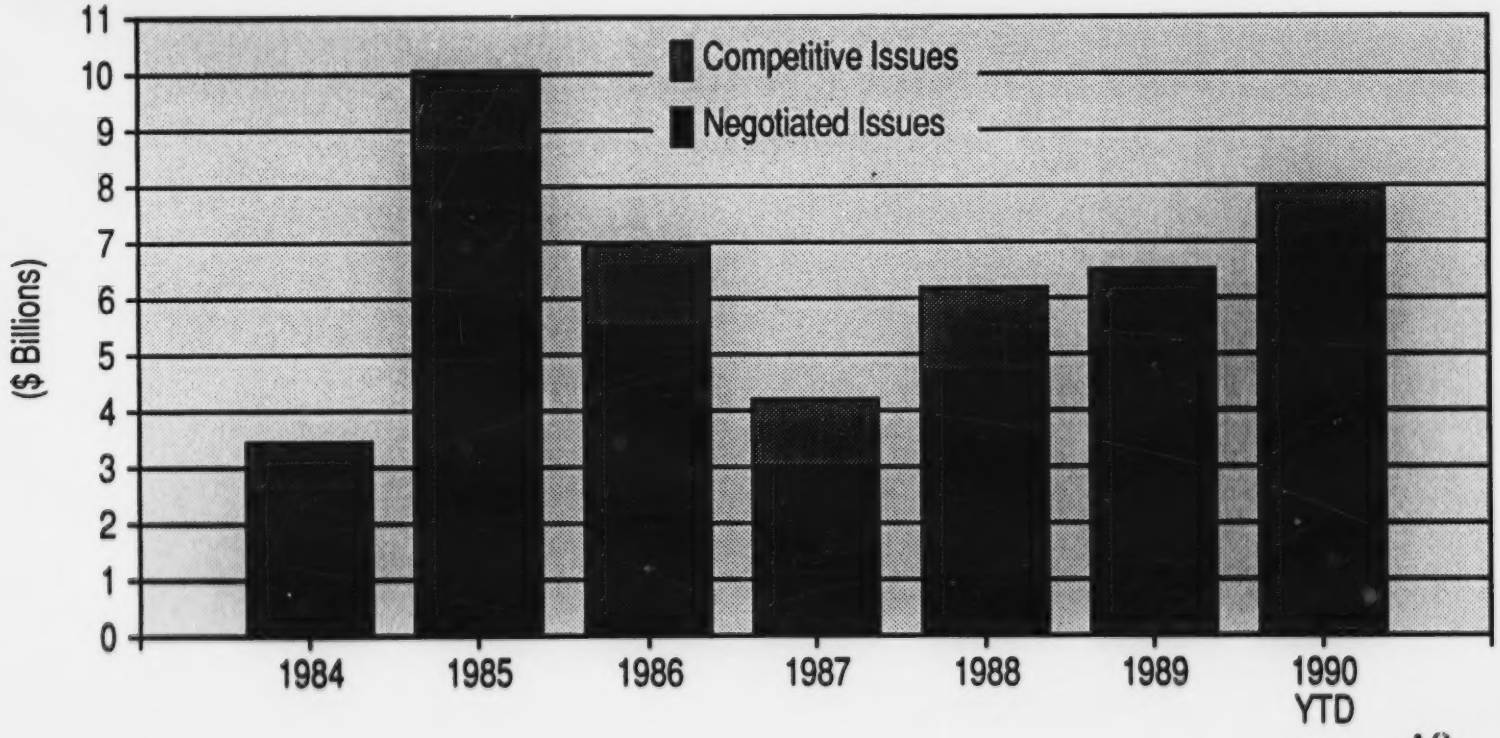


Figure 2

Higher Education Market
Negotiated versus Competitive Issues

1984 to Present



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compared to competitive sales lend themselves to innovative techniques.

Taxable versus Tax-Exempt Financings

One of the restrictions of the Tax Reform Act was to limit private colleges and universities to no more than $150 million in tax-exempt debt at any one time. You can see from Figure 3 that this restriction is taking hold. Traditionally, almost 100 percent of all college financing was done on a tax-exempt basis. It makes a lot of sense, because tax-exempt financing provides the lowest cost of capital. That is, of course, if you can get it. Entering 1988, 1989, and 1990, more and more institutions got into the taxable arena because of the tax law. In 1990, there has been a small block of taxable financings that represent about $400 million; in 1989 it was $200 million; and in 1988 it was $117 million. So you can see that, as the new restrictions have taken hold, more and more schools have been blocked from entering the tax-exempt market and are moving into the taxable arena. We at First Boston expect this trend to continue.

Credit Ratings

The next area I wish to explore is credit ratings, one of the areas I find most fascinating about college financing. Higher education bonds have always been well received by investors, whether they are big institutional investors that buy in blocks of $10 million and $20 million, or retail investors who buy in blocks of $5,000 and $10,000. Investors are shying away from securities issued by hospitals and are moving toward general obligation bonds and higher education revenue bonds. There is a certain stability that investors see in higher education and a real strong market acceptance that we at First Boston do not see changing, even though colleges are confronting some real threats in the next three to five years in terms of demographics and their continued viability.

A rating is the most important indicator of creditworthiness, and we encourage all our clients to approach one if not all three rating agencies--Moody's, Standard and Poor's, and Fitch--to get either a public rating or a private rating. We find that it is useful to obtain a rating because it is an objective measure of strength and viability of the institution. We separate credit ratings of colleges and universities into two main groups: private and public. As you know, they are two different animals.

Ratings of private colleges vary across the board. Figure 4 displays rating medians of schools rated by Standard and Poor's, and a pattern emerges quickly. There are six AAA universities in our country, forty-three AA, seventy-five A, and forty BBB. In the next three to five years we see the majority of growth in the A and BBB categories for two reasons. First, schools are realizing more and more that tax-exempt financing or public offerings represent the lowest cost of capital for them. We are seeing a greater number of school financings these days. Ten years ago there was the perception that unless you had a $2

Figure 3

Higher Education Market
Taxable versus Tax-Exempt Issues

1984 to Present

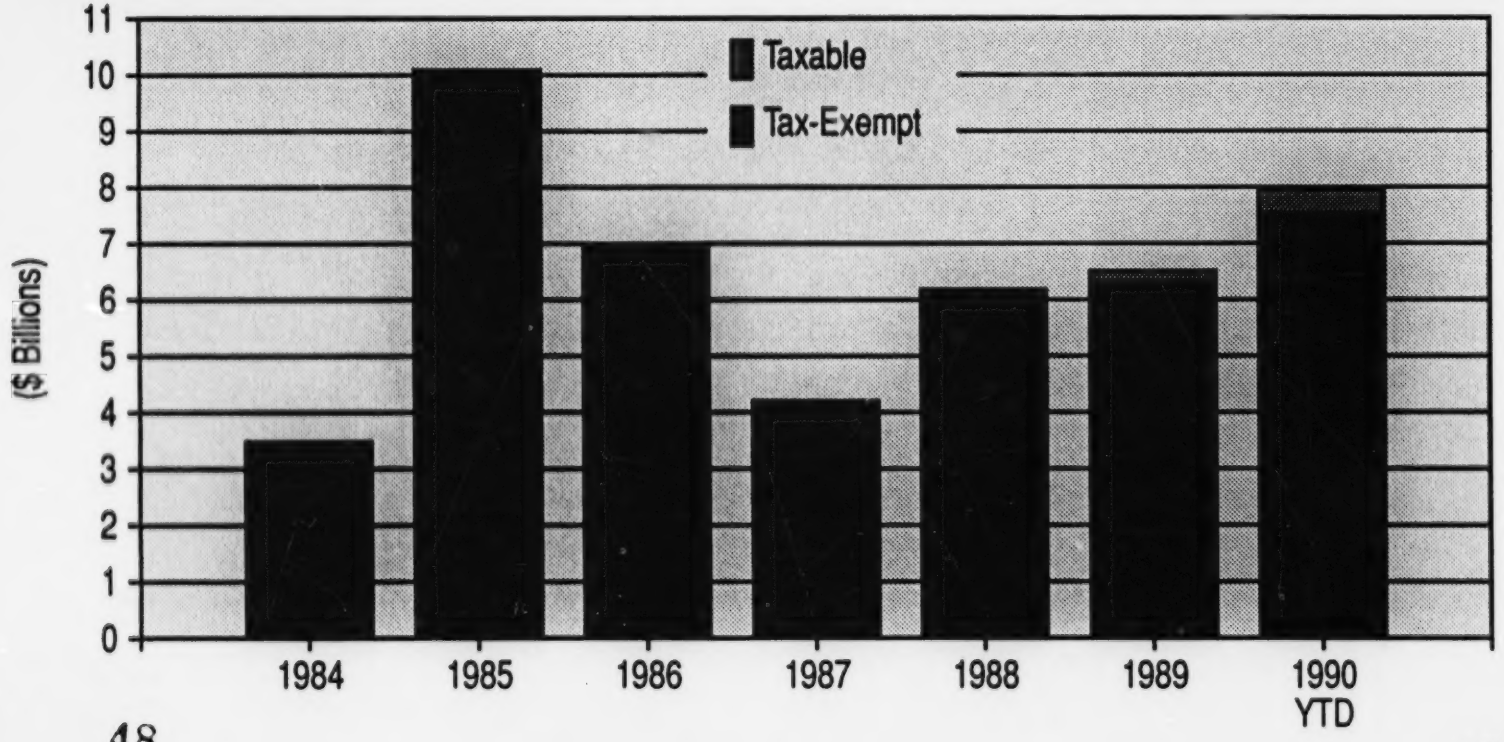

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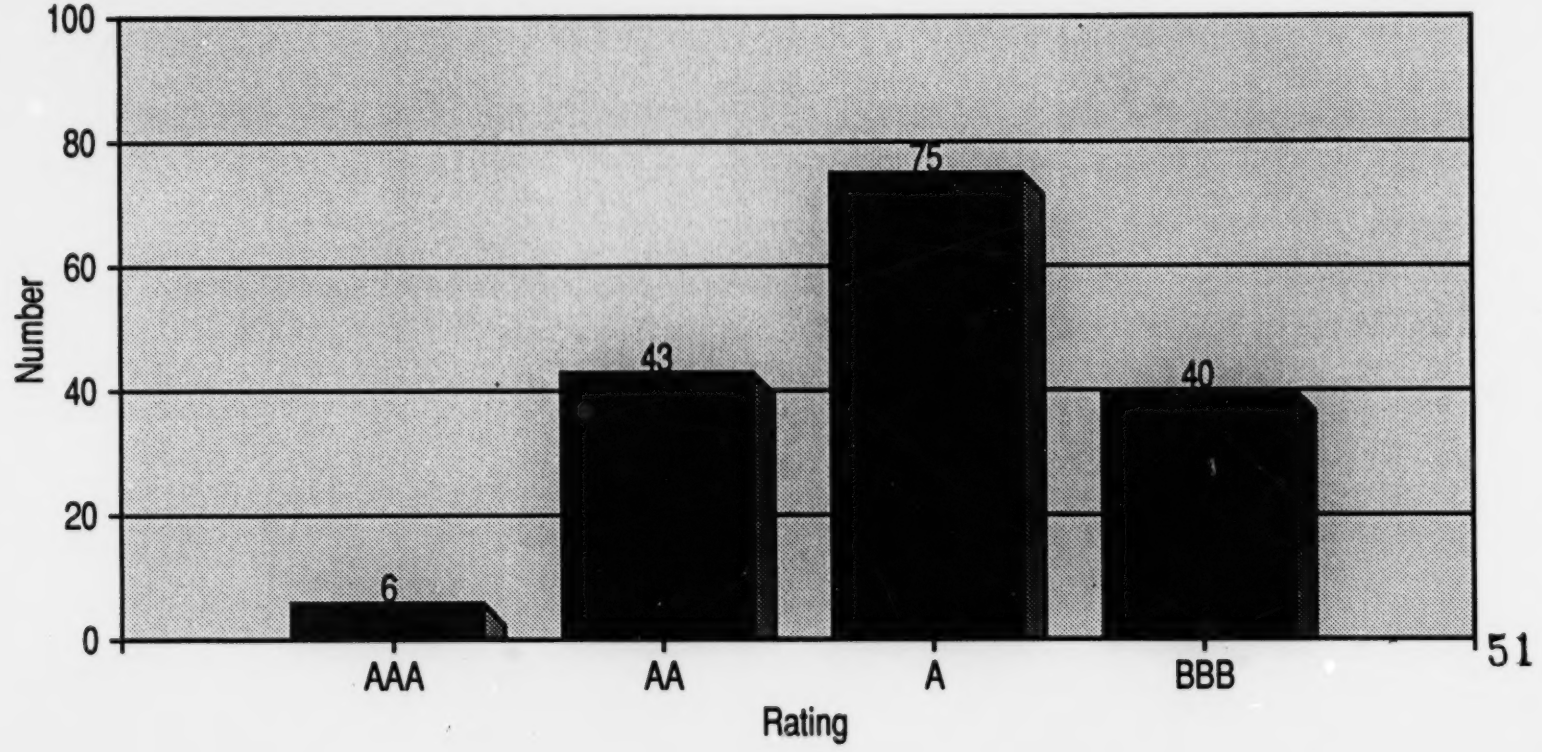
Figure 4

Private Colleges and Universities

Rating Distribution



billion endowment and other strong demand ratios, investors would not be interested in securities issued on your behalf. This could not be farther from the truth, and schools are realizing this.

The second reason we see growth in the BBB and the A category is an unfortunate one for the privates. That is, demographics are working against you for the next couple of years, and that is going to be putting stress on your financial position. We expect some credit deterioration of colleges and universities.

Figure 5 shows the characteristics of each of the rating groups. AAA-rated institutions are large schools, but that is not the best indicator. As in real estate where there are three things that are important--location, location, location--within higher education it is widely recognized by investors and rating agencies that it is student demand, student demand, student demand that really drives a school's success now as well as its future viability. Not surprisingly, AAA-rated colleges enjoy strong student demand and large endowments--on average, $2 billion. That equates to around $200,000 per student. They have also been active issuers of debt, principally tax-exempt debt, on the average of $275 million.

Moving down to the AA and A categories, you can see changes in student demand. Acceptance rates jump from 20 percent to 60 percent of applications received. The number of students matriculating decreases as well, from 57 percent down to 40 percent.

The BBB group is the most interesting category and the one that we see increasing, as I mentioned earlier. They have acceptance rates of 75 percent, matriculation rates of 45 percent, an endowment average of $17 million, but they have $20 million in debt. We probably have a half dozen BBB-category schools among our client base and, in almost every case, their debt exceeds their endowment. Obviously, it is not the most prudent philosophy to carry forward, but it is not these schools' choice; rather it is economic reality. They have lists of capital needs that they cannot meet with operating income, gifts, grants, or straight quasi-endowments, so they look at the bond market to finance. The good news here is that, unlike the prevailing wisdom five or ten years ago, there is tax-exempt financing available to these schools. For the first time, these institutions have access to 7 to 8 percent tax-exempt long-term interest rates.

The profile of public universities is in stark contrast to privates (see Figure 6). There is much less diversification. There are no AAAs, forty AAs, ninety As, and just a handful of BBBs, and the reason is quite clear. For state-supported institutions, the most important rating criteria is the level and continuity of state aid. You will find that state universities are rated one or two notches below that of their state's general obligation rating. New York is a good example: it is rated A+ and its state university, SUNY, is rated A-. You will see that kind of parallel; if the state is rated AA, then its university will be in the A category. State aid is the single most important driving factor in determining public colleges' ratings.

Figure 5

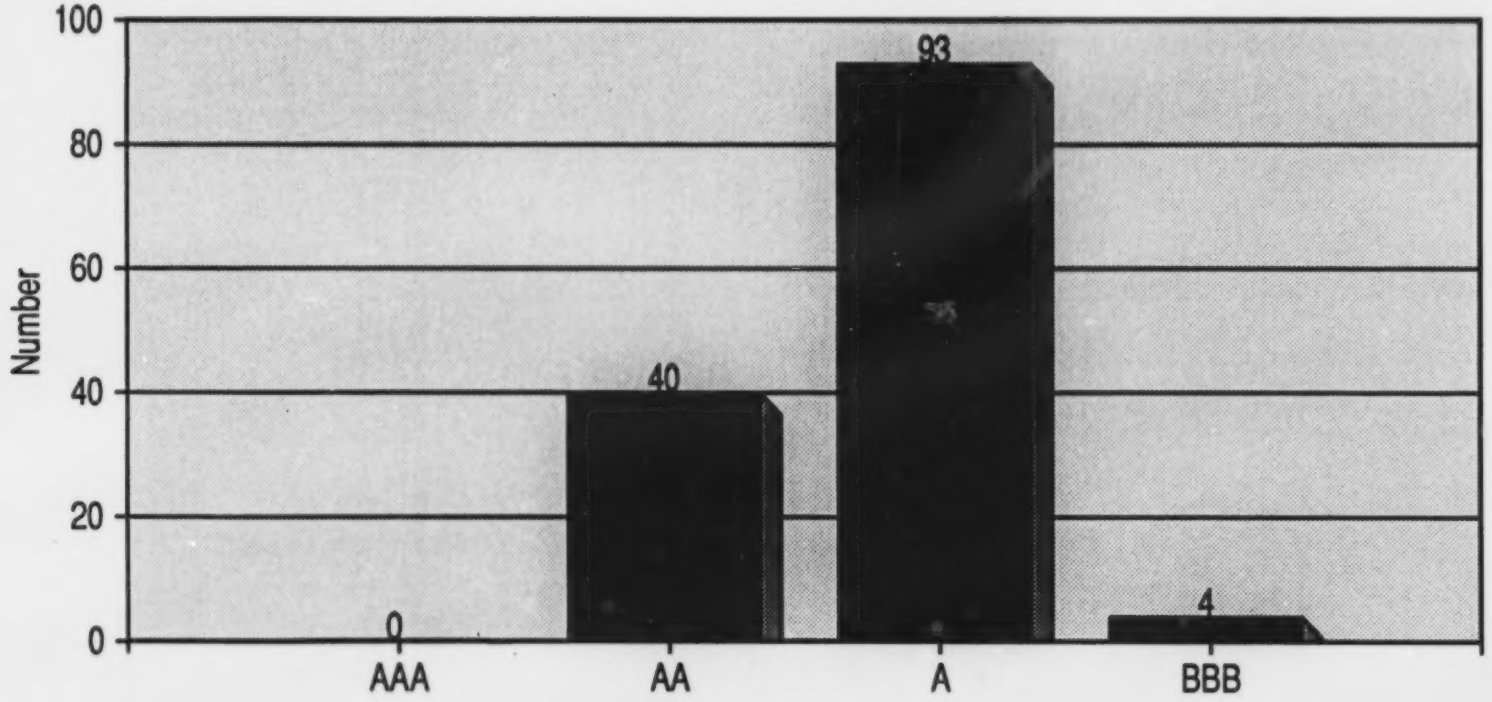
Key Private College Rating Characteristics

	Rating			
	AAA	AA	A	BBB
Enrollment	9,500	6,700	6,000	3,000
Acceptance Rate (%)	20	40	60	75
Matriculation Rate (%)	57	40	40	45
Endowment ($000)	2,000,000	400,000	95,000	17,000
Total Endowment per Student ($)	210,000	62,000	16,000	5,600
Debt ($000)	275	140	55	20

Figure 6

Public Colleges and Universities

Rating Distribution



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Interest Rates

Figure 7 is not a copy of your EKG, but rather a ten-year history of interest rates. Since the Iraqi invasion of Kuwait on August 2, the market has been in turmoil. Taxable bond rates have increased 50 basis points. Tax-exempt interest rates have risen almost as much. A good deal of my time has been spent on the phone counseling our clients that are coming to market.

One of the things that we have been sharing with them is that, although it is easy to get caught up in the day-to-day disruptions of the market and to get concerned that interest rates are going up, they should take comfort in the fact that, from a ten-year perspective, fixed rates are very attractive. Except for a period of time in 1987, there has not been a better time to issue fixed-rate, long-term tax-exempt bonds.

There are three areas to consider when looking at the environment for opportunities and strategies. One is funding sources, the other two are the capital markets--both tax-exempt and taxable. Basic financing strategies deal with whether your bond issue is going to be taxable or tax-exempt. If there is any way you can issue tax-exempt bonds, you should do it. It makes the most sense in terms of cost and flexibility. The difference between a thirty-year tax-exempt rate and a thirty-year taxable rate is probably 300 basis points, 3 percent. You multiply that against $10 million or $20 million or $30 million, and it starts adding up to some real dollars. Clearly, the tax-exempt route is the best one for any institution.

Fixed versus Variable Rate Financing

Colleges have been aggressive users of variable rate financing. It is a technique that is used to bring down your cost of capital. It is generally reserved for stronger colleges and universities because as easily as interest rates can float down, they can also rise. We always encourage colleges to acquire cash reserves before they aggressively use variable rate debt. Variable rate debt today on a tax-exempt basis is around 5 percent compared to 8 percent on a market basis.

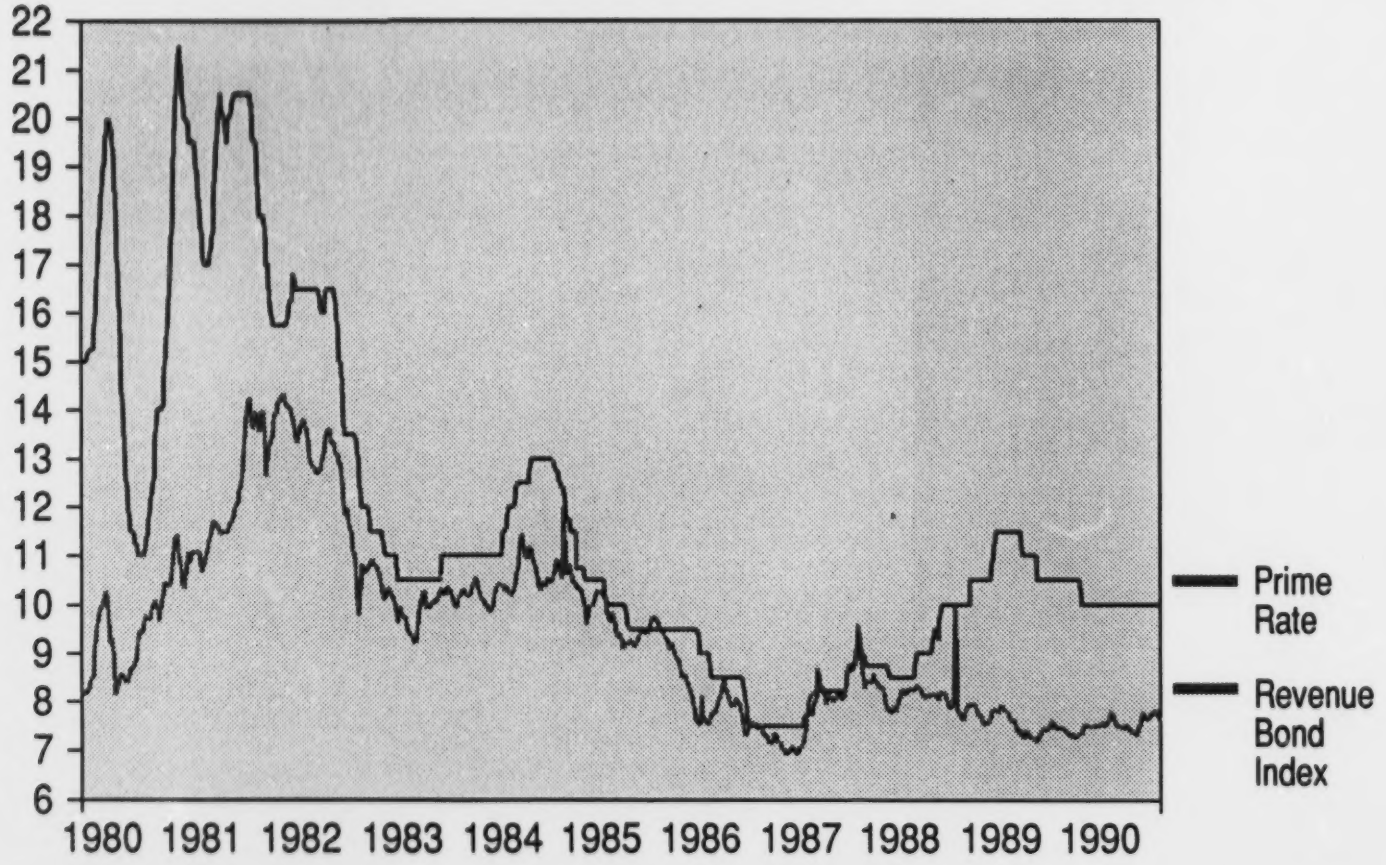
Public Offerings versus Private Placements

The choice between completing a public or private placement needs to be made on a case-by-case basis. For the most part, the vast majority of the schools do public offerings because they offer more flexibility and lower cost.

Innovative Techniques

Earlier I mentioned that schools are in the forefront of emerging techniques. It is only fitting that we are in the Leavey Center today, because in 1988 Georgetown University issued exchangeable bonds that were underwritten by First Boston, the proceeds of which were used to fund this very center. Exchangeable bonds are a new instrument that are ideally suited to schools that are blocked from the tax-exempt market for a temporary period of

Figure 7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Prime Rate
Revenue Bond Index

time.

In 1988, Georgetown found itself blocked by the District of Columbia from issuing tax-exempt bonds for various reasons. They were confident, however, that the District would issue tax-exempt bonds on their behalf sometime in the future. But the university needed the money now, so they issued exchangeable bonds. They started out as taxable, with interest rates of around 9.5 to 10 percent. But when they were sold to investors, they were also sold at preset tax-exempt issues rates of 8 percent. The university had the sole option to exchange the taxable bonds to tax-exempt bonds at any time. In Georgetown's case, they came back nine months later and turned their 9.5 or 10 percent taxable bonds into 8 percent tax-exempt bonds. And it was a good bet for them because, in the meantime, tax-exempt interest rates have risen.

In the past, investors rating agencies always felt more comfortable that a reserve fund be funded as part of the issue. If you were issuing $20 million in bonds, you would have reserve funds of $1 million or $2 million. Prior to 1986 that was something that was not necessarily unwelcome by schools, because you could earn money at an unrestricted rate on reserve funds. That is, if you were paying 8 percent on your bonds and you could earn 10 percent on your reserve fund investments, you would keep the 2 percent. The reserve fund goes on your balance sheet as an asset to offset the liability. But in 1986, one of the restrictions placed on colleges was something called arbitrage rebate, which sounds foreign. It is foreign, and bad. It forces you to give back to the government any excess earnings over your cost of money. With that, there was a movement on behalf of schools and tax-exempt issuers generally to push the rating agencies and investors to reduce or eliminate the requirement for the reserve fund.

Generally, schools rated A+ or better have a good chance of being able to waive or eliminate the reserve fund. For those below A+ but above BBB, there are various ways for you to get to this same goal. You may buy an insurance policy or a letter of credit that acts as a reserve fund.

Who's Buying Tax-Exempt Bonds?

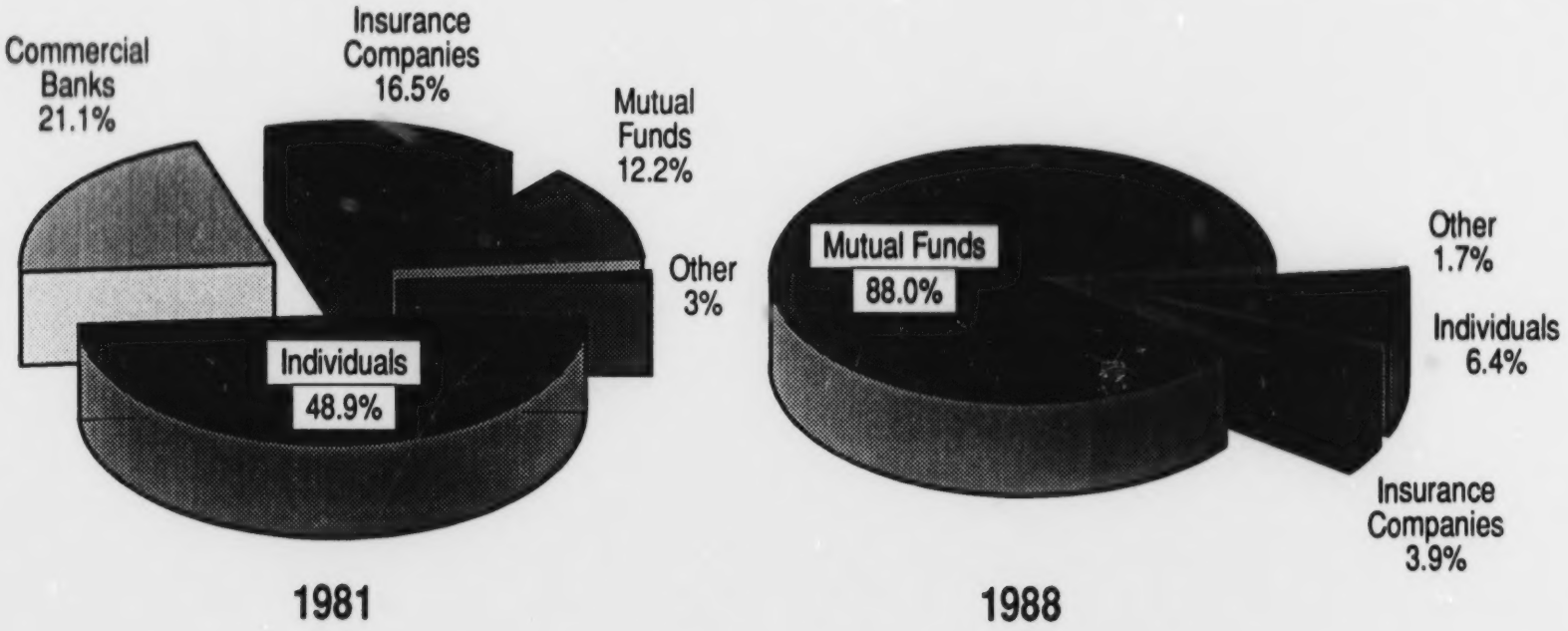
Ten years ago, nearly 50 percent of all tax-exempt bonds were purchased by individuals. Today, individuals are still buying bonds, but they are buying them in a different way. Rather than going to brokers and saying, "Give me $10,000 of College 'X' bonds" and being vulnerable to credit deterioration, individuals are investing their money into tax-exempt funds to achive diversification. In Figure 8, you can see that in 1981 individuals were buying 50 percent. But now direct purchases by individuals are down to 6 percent, while tax-exempt funds represent 88 percent.

The important thing for schools and universities and other issuers of tax-exempt debt to remember is that individuals are no longer making the first decision. Rather, the portfolio manager is in charge of deciding what the fund is going to buy. These people buy in blocks of $10 million and $20 million. The

Figure 8

Institutionalization of the Tax-Exempt Market

Purchasers of Tax-Exempt Bonds



SOURCE: Federal Reserve Board of Funds Account

net result is that institutional investors represent the price determinant sector of the tax-exempt market. Again, individuals are not getting out of the market, but rather are buying bonds in a different way. They are buying them through tax-exempt funds in order to diversify their risk.

Taxable Capital Markets

I mentioned earlier that this year more than $400 million taxable bonds will be issued by schools. Why is that? One reason is that while most schools are blocked from entering the tax-exempt market, they still have ongoing needs for capital. From First Boston's standpoint, we think the possibility of continuing restrictions and even increasing restrictions is great. There was a glimmer of hope in the last couple of weeks when we were hearing that the $150 million cap was going to fall away. Unfortunately, the net result was that our tax rates have increased. It went from very good to very bad. We believe that restrictions on the ability of schools to finance will increase in the future.

Generally, taxable securities are priced in a simpler fashion than in the tax-exempt market. Whether you are General Motors or Saint Olaf's College or Northwestern University, all issues in the taxable arena are priced at a spread over government securities.

For example, if Georgetown University were to come on the market today issuing twenty-year bonds, they would probably carry an interest rate of 100 to 150 basis points over the twenty-year U.S. Treasury Bond. At 9 percent, they would carry rates of about 10.5 percent for twenty years. Everything is priced at a spread over your comparable treasury security. Obviously, the spreads are going to vary according to supply and demand, quality, and security size.

Investors in the taxable market need liquidity. They need to have some kind of assurance that if they want to turn around and sell their securities for whatever reason, there is somebody to buy them. In order to achieve the best price on mature liquidity, issue sizes in excess of $50 million generally are desirable. That is not a practical figure for colleges and universities, but this is not a problem. We have done smaller issues and they have been well received by the market on issues of $8 million, $10 million, or $15 million.

There are many similarities between tax-exempt and taxable investors. In general, they are institutional in nature rather than retail. Many purchasers of taxable muni's are traditional buyers of tax-exempts: banks, property and casualty companies. Pension funds are significant purchasers because taxable muni's often carry higher yields to comparably rated, more familiar corporate bonds. Finally, we're seeing high-net-worth individuals entering the market because often taxable bonds are not exempt from federal taxes but are exempt from local taxes. I know in New York State, with our tax rates going up to the roof, that is going to be of greater appeal to individual investors.

Funding Sources

John W. Gibb
Director, Public Finance
Sallie Mae

When Sallie Mae entered the business of financing colleges and universities in 1987, we spent time with different postsecondary organizations here in Washington to determine their facilities finance needs. When we asked, what would be most helpful to them, they said, "First, low costs. Second, more flexibility. Third, quick turnaround. And one more thing: Will you help us with the small financings as well as the large financings?" All quite logical requests--but sometimes hard to satisfy.

Since then, Sallie Mae has tried to tailor financings to achieve those objectives. I will review Sallie Mae's products and try to bring out how we have achieved the low costs, introduced flexibility and catered to the small financing needs.

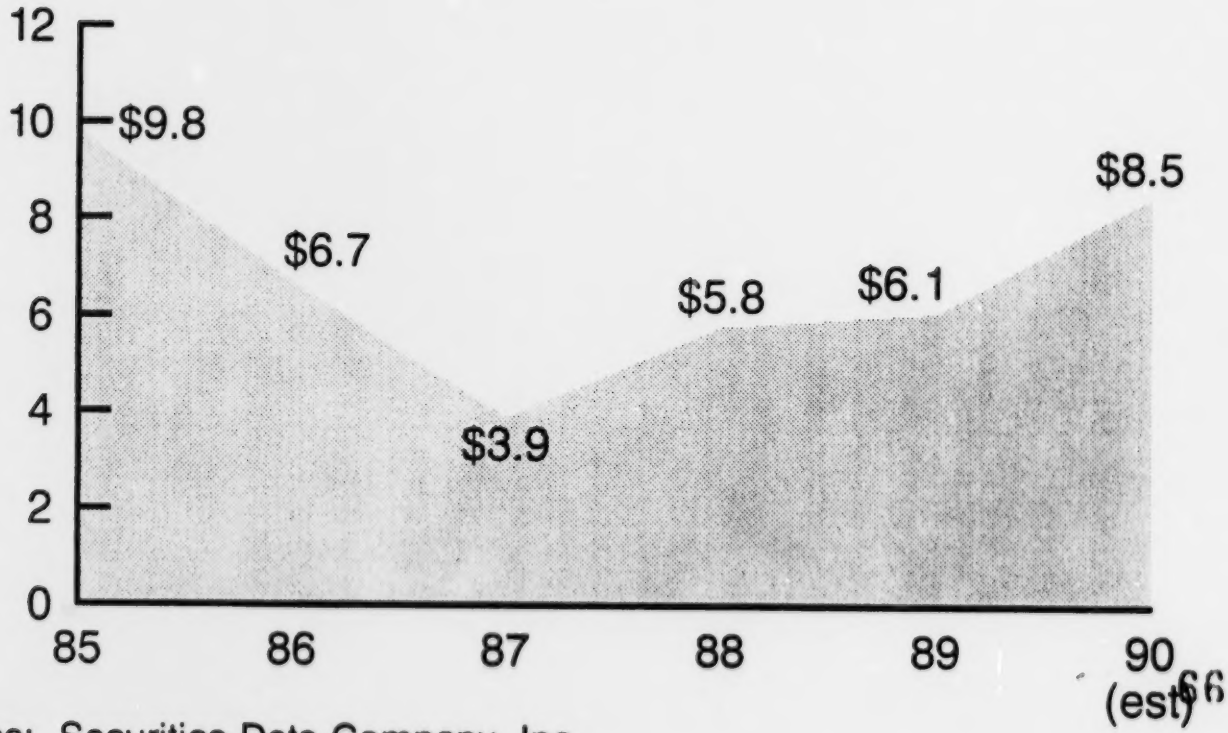
Sallie Mae was federally chartered in 1972 to serve as the nation's financial intermediary to higher education. Our primary business has been purchasing and financing student loans. Today, Sallie Mae owns about a third of all the guaranteed student loans outstanding in the United States. Sallie Mae is traded on the New York Stock Exchange, and is one of the 100 largest corporations in the country. In late 1986, our federal charter was expanded to give Sallie Mae the additional authority of financing facilities at colleges and universities. Since then we have either provided or supported over $1.5 billion of funding for such purposes.

Figure 1 shows the long-term debt picture since 1985 for colleges and universities. We estimate about $8.5 billion will be borrowed in 1990.* A large portion of that comes from the New York State Dormitory Authority, which refunded $3.9 billion worth of bonds in 1990.

*According to Securities Data, final postsecondary volume for 1990 was $8.17 billion.

Figure 1

College & University Bond Issues 1985-1990 ($'s in Billions)



Source: Securities Data Company, Inc.

Figure 2 shows the small percentage of universities rated less than A- that issue debt. In 1990, approximately 17 percent of the debt was rated below A-. So, only a small percentage of private colleges are issuing debt in the public marketplace.

According to APPA, the annual dollar amount a college spends on renovations is about $2 million. Yet, Figure 3 shows that very few of the issues in 1990--only about 15 percent--were less than $2 million. That is because it is simply not economical to tap the public markets for very small amounts of tax-exempt financing, mainly due to the large up front costs of such issues. For that reason, universities tend to group their expenditures into larger issues.

Sallie Mae Products

Sallie Mae provides five general categories of facilities finance products:

1. Statewide capital facilities programs.
2. Purchase of stand-alone tax-exempt issues.
3. Taxable loans and lines.
4. Tax-exempt leases.
5. Liquidity agreements.

The following addresses the first three.

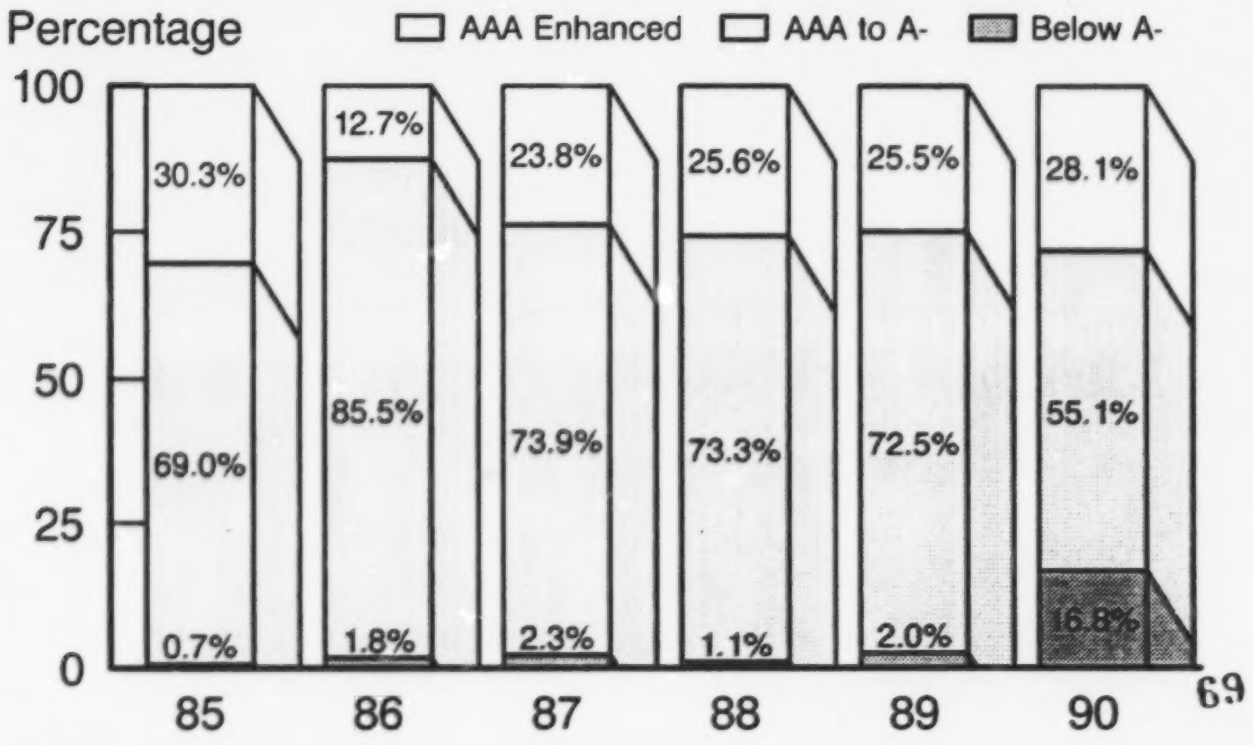
Statewide Programs

So far there are nine states in which we have set up statewide tax-exempt programs: California (two programs), Illinois, Louisiana, Massachusetts, Ohio, Pennsylvania, South Dakota, Virginia, and Wisconsin.* These provide small amounts of tax-exempt financing--$500,000 and up to $10 million--on a private placement basis.

***A program is being established with Kentucky in January 1991.**

Figure 2

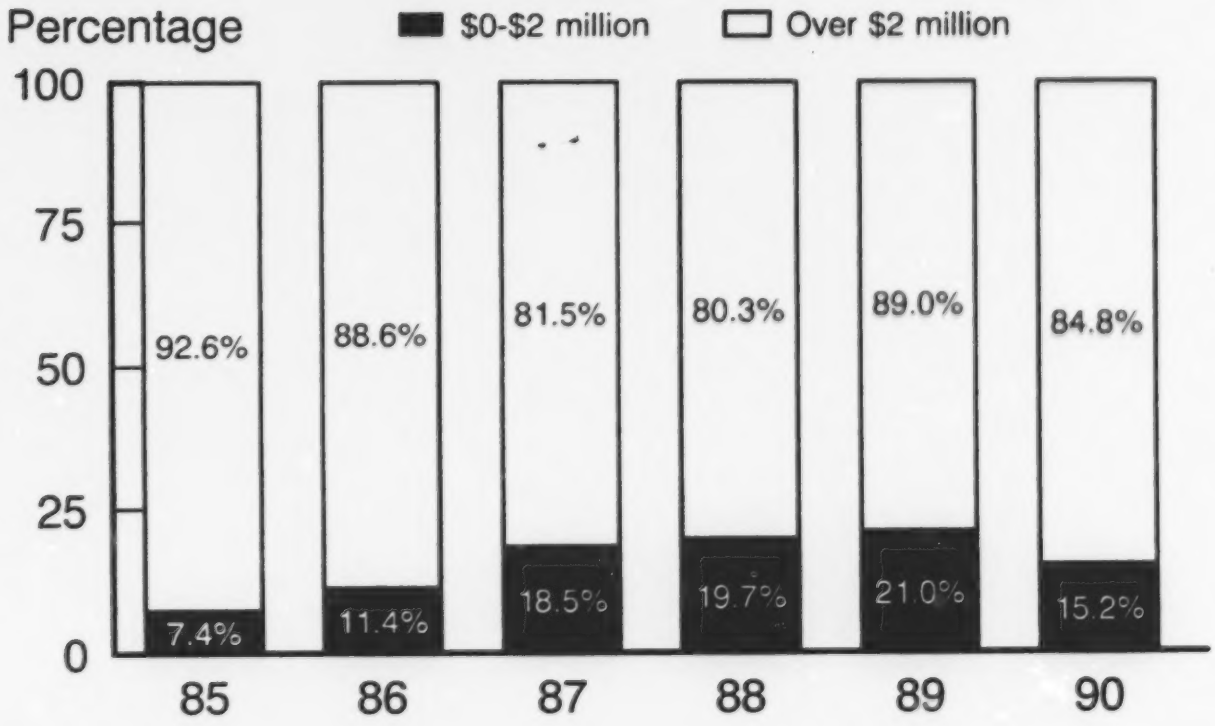
College & University Financing by S&P Rating Category



Source: Securities Data Company, Inc.

Figure 3

College & University Financing by Deal Size



Source: Securities Data Company, Inc.

The characteristics of these programs are, first, low cost: the up-front fees are kept at 2 percent or less. In Virginia, for example, the fees run 0.9 percent; in Pennsylvania, 1.3 percent. There are no underwriter fees because the bonds are placed directly with Sallie Mae. Nor are there any requirements for bond ratings, letters of credit, insurance, or official statements, all of which increase costs.

The second characteristic is ease and speed. We have a standard set of documents that are governed by a master indenture, and then as each financing is closed, we have a supplemental indenture to close that particular issue. So once the standard legal documents are set up, it is mostly a case of "filling in the blanks" to tailor the financing for that particular college.

The third characteristic is flexibility. For example, allowing a school the option to select a variable rate and converting later to fixed rate, or offering varying prepayment and amortization terms.

The interest rates in the program are indexed to taxable rates, pegged slightly higher than publicly traded issues since these bonds are illiquid to Sallie Mae. Although the coupon rates are higher, the up-front costs are significantly lower, so the all-in interest cost is lower. And, since the issuance costs in Sallie Mae's statewide programs are kept to 2 percent or lower, the college need not pay any out-of-pocket expenses. There is, of course, an opportunity cost to the college of "footing" the out-of-pocket expenses.

Stand-alone Tax-Exempt Purchases

The statewide programs are primarily targeted to institutions that need small amounts of financing. Schools that want to issue a large amount of financing would be much better served by having an underwritten public offering or privately placing the debt with Sallie Mae. In this instance, provided Sallie Mae has proper disclosure documents, we will price the bonds to market.

Taxable Debt

Why would a college want to issue taxable debt since, generally speaking, it is less costly to issue tax-exempt debt. It may be that the college is a private college which has "capped out". There are approximately two dozen colleges in that category. It may be a college that wants to do a short-term bridge loan. Or it may be a college with such a small financing need that, all the headaches and large up-front costs of tax-exempt debt would not be worthwhile.

Whatever the case, Sallie Mae could set up the taxable financing as either a term loan or a line of credit. For example, over the course of a year, an institution may wish to borrow from Sallie Mae as it purchases equipment. At the end of that one-year period, we would roll all the drawdowns under the line of credit into a long-term loan. Or, we may offer a line of credit for a college to draw down as it constructs a building. When the building is complete, the college rolls it over into longer-term debt.

The major advantage of a taxable financing with Sallie Mae is that we are able to provide extremely competitive rates. And, there are low up-front costs associated with such financings. Our legal documents are mercifully brief.

In another application of our facilities financing, Sallie Mae might provide financing to a foundation or developer which would construct student or faculty housing, for example. For Sallie Mae to provide financing, there must be an educational relationship for what is being financed. We do not lend to colleges and universities for such projects as shopping centers or car washes, but only for purposes related to the mission of education--such as student or faculty housing.

Several different arrangements in financing a developer or foundation are possible. For example, the college may guarantee the debt service. As a quid pro quo, the college might exchange the right to master-lease units, obtain a

certain percentage of cash flow, obtain a certain percentage of the refinancing proceeds or the proceeds upon sale, et cetera. As a result, the developer obtains competitive financing from Sallie Mae while the college also benefits financially.

To sum up, based on the feedback that we have received from colleges, we have tried to set up programs that are low cost, flexible and respond promptly to college demands. At the same time, we have emphasized the smaller financings. We think they warrant consideration by any college or university considering how to meet its facilities needs.

Sallie Mae greatly appreciates the opportunity to speak to the APPA Institute. We look forward to hearing from you.

Sale/Leaseback: A Brief Discussion

David M. Cyganowski
Vice President and Manager of Higher Education Finance
The First Boston Corporation

John W. Gibb
Director, Public Finance
Sallie Mae

Participant: A lot of times sale/leaseback will allow you to go off balance sheet or go to a third party, having that third party take on a debt. Unless you have some particular external factors that are driving it, you should try to get the lowest cost capital. In other words, say you were building a $25 million auditorium and you had the options with sale/leaseback. Do that on a floating rate basis and buy 6 percent for thirty years on a tax-exempt basis. That would be 8 percent.

David Cyganowski: Your benchmark and your analysis should be what gives you the greater benefit. What are the external factors? You could have a board or community that is philosophically opposed to debt and be of a very conservative nature. In terms of their emotional tolerance, they would not encourage you to do a $30 million financing, yet would allow a $30 million sale/leaseback. That's an external consideration that may push you to do sale/leaseback.

Absent those externalities, is the principle effective? I believe it is. You can lock in the lowest costing capital. Generally if you go to a developer or other third party where their access is to the taxable market, the chances are they can't get financing as long-term as you could or at as low an interest rate as you could because developers generally go to the bank or they go to venture capitalists and maturities are five to ten years at that. The funding source is generally at taxable rate which is treasuries plus something, or prime plus something. I think, again, absent those externalities, you'll find that it will be tax-exempt financing.

John Gibb: We have not been involved in any sale sale/leaseback programs at Sallie Mae, but we looked at a couple. One thing that you have to be very careful of is that the advantage of a sale/leaseback comes, of course, when the lessee gets its advantage by the depreciation and the tax benefits that it receives. And, of course, that is certainly affected by the depreciation schedules, the tax schedules. You've got to be very mindful of that in putting together your financing package. It can get to be fairly complicated and really easy to make a mistake, so you want to be sure you know what you're doing on something like that.

Presumably, on a sale/leaseback, you've sold the property and the property is owned by the developer. The developer is receiving a property tax benefit and, presumably, that's being passed on to you. Certainly I think Dave expressed it best, and that is that, before you get into a scheme like that, I think you've got to be very knowledgeable of what you're doing. It's much simpler and you're certainly going to get your lowest rate through tax-exempt financing done by your own institution.

Contracting for Services

William D. Middleton
Assistant Vice President, Facilities Management
University of Virginia

Contracting for services is really an operating budget issue, but it certainly reflects upon the capital issues. In fact, it relates directly to the problem of adequately maintaining our capital assets.

Generally, contracting for services is common in facilities management because it is often the preferred and the most economical means of accomplishing certain functions. Indeed, there are certain areas in which contracting is almost traditional. What we are seeing today in higher education--and really, it is much broader than just higher education--is a growing interest by the public sector in privatization as the route to reduce costs. Some of the areas in which there has been accelerated movement in that direction in the last decade or so include bookstore operations, food services, and telecommunications, where there has been a major shift to contract performance of services that were traditionally done by college or university staff.

In the area of facilities, there is a substantial and growing industry that is offering various forms of facilities services. It might be the provision of specific functions, management functions, or management of the entire facilities operation by contract. There is, for example, a significant number of small colleges today that run their entire facilities operations as a contract function. And there are some substantial universities that are doing that as well. Brown University, for example, operates its facilities program by contract. Carnegie-Mellon University apparently has contracted that function as well. So we are seeing increasing movement toward contracting, with more and more companies aggressively marketing these services.

During the past year, one of the things that we have been doing in APPA has been to develop a long-range plan in which we have attempted to identify some of the major issues confronting facilities managers over the next decade. We identified seven major issues for the facilities management profession, and one of those was contracting of facilities services. It might be informative to repeat just what we said in our long-range plan about that:

> Throughout higher education there is a growing interest in contract performance of all forms of support

> services as a means of obtaining more effective and economical services. Facilities officers must be prepared to effectively procure and utilize contract resources whenever they represent the best source of facilities services.

The goal for the profession that we set that reflects this issue was: "To develop means to identify and evaluate cost effectiveness and appropriateness of contract resources."

This issue can be an emotional one for many facilities managers. It is really the issue for a lot of people in our profession. Just mention contract performance of physical plant functions if you want to get a rise out of your facilities person.

But what is the reality here? Looking at in-house services, there are many positive factors that people will always bring up: staff loyalty, dedication, commitment, continuity, responsiveness, flexibility, and high-quality service. And what are the negatives? As I remarked to somebody the other day, you could almost engrave in stone over the entrance gates of every college and university in the country two things you always hear about in-house physical plant services: "They cost too much" and "They take too long." Usually that is a perception that our faculties hold, but I submit that it is often true.

Our industry, higher education, is under fire for high and rising costs for our product. Tuition rates are rising much faster than the rate of inflation at the same time that we have an enormous need for facilities programs that are underfunded. We must explore the privatization alternative in every possible way. I would set forth that unless in-house service is the most economical way of providing an acceptable level of service, why are we doing it?

At this point I would like to discuss several things related to this issue, and briefly review why I think we should consider contracting-out of services, some key principles of effective contracting, and ways to use privatization as a management tool.

Why Contract?

There are many reasons to contract for services. To briefly summarize them, we often have specialized services that are infeasible to provide with our in-house staffs. There also may be services that are infrequently required, and it is simply not reasonable to have the capability to do something we only need once in a while. We want to avoid high capital costs, and there are some functions in the facilities business that require a substantial investment for various kinds of equipment, for example. We can avoid these costs by contracting out these services. We also may want to contract in order to obtain greater economy and efficiency, meet peak workload requirements, or to obtain management resources that are not really possible within our own organization.

There are also some disadvantages to contracting for services. When we contract out, we lose that loyalty and

dedication that we had with in-house employees. We find that contractors are often--perhaps usually--less responsive to special needs or changed requirements. All too often with contract performance we get only the minimum requirements for our contract. And, of course, every time we change contractors, there is an enormous loss of continuity and knowledge in providing the service.

There are many kinds of services that are usually contracted. For example, our professional and consulting services are typically contracted, and we almost always contract construction. In addition, we can contract many forms of maintenance and operating services, such as these:

- Inspection of facilities and equipment. This area includes maintenance services or preventive maintenance and the operation of whole facilities, plants, or systems. Again, there is a major industry out there that specializes in operating various kinds of utility plants. If you have that kind of a function, that is certainly one for which it is feasible to test the contract alternative.

- Refuse collection and disposal. This is a prime example of the kind of contract where we can avoid high capital costs for equipment. The only effective way to handle solid waste disposal and collection these days is with compactor trucks and very large containers, all of which represent an enormous investment. If we contract for that, we typically contract with someone that makes that investment and spreads the costs over a large number of clients. They can provide the service to us at far lower costs than we could ever hope to do if we operated our own operation.

- Grounds maintenance, snow removal, and custodial services are all frequently contracted.

- Pest control is an example of a function requiring very specialized, certified personnel. It is one of those things that would be very costly to try to do yourself.

- Transportation services are often contracted out.

- Management services represent an area in which contracting can be extremely effective. We can contract to manage a particular operation or function, or for management and supervision of the entire physical plant function. There are several major companies in the field today who will contract, not to provide a facilities service, but to manage it for you with your own employees.

Principles of Contracting

There are many types and forms of contracts that can be used, but they all have to satisfy some very basic conditions. It is essential in any form of contracting that there be a true "meeting of the minds" between the institution and the

contractor. A successful contract must establish a specific understanding concerning several items.

You must agree on the specific goods or services that are going to be provided by the contract, required performance and quality standards, delivery requirements and schedule, and the consideration to be paid to the contractor and any related terms or conditions. If you fail in any of these areas in establishing a contract, you are going to have problems.

Touching briefly on the types and forms of contracts, competitive bidding is, of course, the most common means of contracting. In this process, contractors are all going to provide exactly whatever goods or services you specify, and they compete on the basis of price. This can be through a lump sum contract, either a long-term or a one-time contract. Or, if you are not sure of the quantity of the goods or services, it can be a unit price contract.

Another form of contracting, usually called competitive negotiation, can be used when considerations other than price alone are important. For example, you might have a procurement under which you know that of all the prospective contractors cannot provide identical goods or services. A computerized management system for a preventive maintenance program is an example. Every vendor out there is going to have a different system and a different program. You must have a form of contracting and procurement under which you can weigh the different systems that are being offered and make a judgment as to which is best for you. You may expect each offeror to propose a somewhat different way of providing a particular service. You want to have a way of evaluating the different ways that are presented by different contractors. You may feel that the experience and qualifications of the offerors of the service are important to you. Frequently you will be concerned about the experience and qualifications of the specific individuals who will provide some service or management function.

You want to be able to evaluate all of these things as well as the price of the service, so you use a competitive negotiation procedure. The most common means of doing that is through a "request for proposal" format. In a typical format for a competitive negotiation procurement, a request for proposals is issued that basically establishes what you want in the way of goods or services. You will then receive and evaluate proposals from different suppliers of those goods or services. Then the process requires that you have some form of numerical evaluation against stated criteria. You tell the contractors, "Here's how we are going to make the selection, and these are the things we are going to consider and evaluate." Then you have a standard procedure under which you evaluate each proposal. You look at the quality of the proposal, the qualifications of the firm or staff that are going to provide it, price, and whatever else you have said is important.

Often this kind of procurement is done as a two-step process. In the first step you might receive proposals and determine which of those are the several best, review those with the proposers, and ask for various changes or improvements. The second step is when you get what is often called the "best and

final offer." Everybody comes back with a revised proposal that forms the basis for final selection.

I would like to focus a little more on competitive negotiation against competitive bidding, because I think it has an important and extremely valuable feature. It provides a way to get at what is frequently one of the major problems in contracting for services: the quality of the service that you get from contractors, particularly when they are selected strictly under a low-bid procurement.

At the University of Virginia, we had an experience in the last year that I am sure many others have encountered in similar form. For more than ten years we have procured a substantial part of our custodial services through contract. We have a large staff of our own, but we deal with expanding work loads by contract rather than by adding to our own staff. This has yielded varying levels of satisfaction. It has always been a cheaper service than we could provide with our own staff because of differences in wages and benefits. But the quality has ranged from pretty lousy to barely acceptable to, occasionally, fairly good. The typical problem in this type of contracting is that it is an extremely competitive environment. In order to get the contract at all, the typical custodial contractor has to shave the pricing right down to the bone. The only way the contractor can make a buck is to, in effect, shortchange the customer in the services that the firm provides.

This situation culminated in early 1990 in the award of a new custodial contract that was effective the first of January. The service was so unsatisfactory that by February 15 we fired the contractor (who is now, interestingly, putting more effort into suing us than he ever put into custodial services). At any rate, we finally decided that we had to find a better way of procuring custodial services.

So we have moved into the competitive negotiation mode in selecting our next custodial contractor, and we are right in the middle of that process now. The request for proposals has been issued. We have told these contractors that we are going to evaluate their record of performance with other institutions, the experience and qualifications of the managers that they plan to provide, and their price. We hope through this process to select not necessarily the cheapest contractor, but the one most likely to provide an acceptable level of service at a fairly economical price. I will let you know how it all turns out.

Privatization as a Management Tool

Earlier I mentioned that there is a growing interest in the public sector in privatization. It has certainly been a high priority of the last two federal administrations to privatize as much as possible. I think this relates to the perception--and, I have to say, often the reality--that in the public sector, the work force is inefficient and unresponsive. The premise behind privatization is to let the private sector competition work to assure that we are getting the lowest cost and the most responsive service.

The federal government has had varying forms of

privatization programs for years. In Virginia we now have something that was established about four years ago by our last governor, called the "make-buy" program. This procedure requires that we compare the cost of services provided in the public sector with the cost of contracted services. I would suggest that even if this is not something that is required, shouldn't we be doing this as a matter of course?

I want to mention something that we are attempting to do at the University of Virginia. It may be premature to talk about it because it may turn out to be a horrible failure, but we are trying to use make-buy analysis as a means of assuring the lowest cost and the most responsive services to our users. .

We recently had our physical plant operation evaluated through APPA's Facilities Management Evaluation Program. It is a very professional program. A team composed of physical plant people and other administrators from all over the country came to look at us. Among other things, they interviewed deans, vice presidents, and members of the faculty. The responses they came back with and that were incorporated into their report were pretty typical. The users of our services said that the quality of work provided by our in-house work force was extremely high. In fact, they said that sometimes it is really higher than they want it. They found an excellent service-oriented attitude on the part of our workers. But again and again they came up with those two phrases: "It costs too much" and "It takes too long."

As a result, we are using this make-buy program to attack the reality of those complaints, or the perception that is behind them. We are trying to restructure our organization to get it into a more entrepreneurial mode. This goes back to an experience that Sean Rush and I had about five or six years ago when we worked together on an evaluation of a major university. We developed a concept that we finally backed away from because we thought it was too radical to put forward to a public university. But we were trying to help that university get at these problems: the perception that the work force was too expensive and took too long. We wondered, "Why don't we just tell this university that they ought to spin off their physical plant organization and make it an outside contractor--make them compete?" We did not recommend it to that university, but I have worked with that idea over the years and we are now trying to do something similar at the University of Virginia.

First of all, our work management organization--the group that controls the flow of work--is going to become what we are calling a "program manager." They will manage the maintenance program, and their job is to get the maintenance for the university, or other work, performed at the lowest possible cost and at an acceptable level of performance. They no longer will have any responsibility, as these organizations usually do, to "feed the shops." In most physical plant operations, the people who control the work flow always feel that one of their missions in life is to be sure that there is enough work for all the painters, plumbers, electricians, and carpenters. We have told our work management people, "Forget about that. Your job now is to get the job done at the lowest possible cost, to get as much maintenance as you can for the dollars that are available."

At the same time, our operations unit is being converted into what I call an "entrepreneurial unit," which is being given the responsibility for setting the prices and schedules for the work they do. We will hold them responsible, through the establishment of financial responsibility units, for the financial results. We are telling them that they must compete for the work.

We are going to be making the broadest possible use of make-buy solicitations. The vehicle we are using is basically a request for bids, just like we do for contract performance normally. But the device that we are using is writing right into the specifications that this is, under the governor's program, a make-buy solicitation. We will get prices from contractors and we will get prices based upon using our own internal work force. Whichever price is lowest is the way we are going to go in this particular solicitation. So far this approach has pretty well avoided the kind of complaints you normally get from contractors when you talk about contractors bidding against public institutions. We tell them right up front, "This is what we're doing. If you don't want to play the game on these terms, don't bother to bid."

We have several goals for this initiative. First, we want to assure ourselves (and our customers, when reimbursable work is involved) that we are indeed getting our services at the lowest possible cost. Second, we hope that it will enhance the productivity of our internal work force. In every instance I know of in which a public agency has tried to do something like this, they have found that the internal work force quickly saw the handwriting on the wall and became more interested than ever before in assuring they really were doing the work in the most economical manner possible. Third, we hope that it will improve the competitiveness of our contractors. We find frequently in areas where we have historically contracted for services that some areas of contracting are extremely competitive while others are not competitive at all. There may only be two or three firms that perform a particular function and, if there is plenty of work to go around, none of them bid very competitively or aggressively.

Just within the last week at the University of Virginia we made a decision to go the other way on a make-buy solicitation. We have done our elevator maintenance, or portions of it, by contract for years. We got bids last week on a renewal of the contract and found that the prices were going to double. We did some quick calculations and decided to bring the work back in-house. If we go out and hire a couple of elevator mechanics, we can save between $50,000 and $100,000 a year. The point is, we think this is going to help improve the competitiveness of our contractors in these kinds of areas.

In closing I would like to mention two helpful references on the subject of contracting. NACUBO has an excellent publication called Contracting for Services that I would recommend highly. And in the second edition of APPA's Facilities Management: A Manual for Plant Administration, an entire chapter is devoted to this subject. The manual will give you many useful principles related to the contract procedure.

Real Estate Management: A Growing Institutional Responsibility

Myron P. Curzan
President
MPC & Associates, Inc.

In today's world of decreasing student enrollments, increasing competition and limited resources, it is particularly important that universities and colleges -- both public and private -- address the management of their real estate assets in an aggressive, innovative and well-thought out manner. The critical areas for university real estate management involve (1) strategic and facilities planning, (2) the identification of possible funding sources, and (3) the development of innovative financing techniques.

Strategic and Facilities Planning

Developing an overall strategic plan is at the heart of creating any type of viable real estate management program. A strategic plan is more than simply a land plan or a project dominated by endless data gathering. Nor is it a "wish list" that aggregates the space and facility needs of all campus constituencies.

As a general rule, the strategic planning process is thorough, iterative, multidisciplinary, and logical. Participants must include key institutional decisionmakers to

spearhead the effort and outside experts to work with these key members and to consistently challenge their assumptions. The process begins with the delineation of an institution's long-term mission and objectives which, in turn, establishes a framework for quantifying space and facility needs. The analysis is then framed by a definition of institutional assets -- land, capital, reputation in the community, etc. -- and institutional constraints. The latter can be segmented into two categories: financial constraints and, of equal importance in today's world, political and demographic constraints. Financial constraints will be addressed below. University real estate managers must deal with demographic and political constraints on a daily basis. For example, the manner in which national population trends affect student enrollments is a critical piece of the puzzle that helps to shape an institution's mission and determine its future facility and space needs.

A successful strategic plan will include the prioritization of development and renovation projects. Faced with the implementation of these projects, an institution can typically reduce its capital costs by fifteen to twenty-five percent through a strong and logical planning process. This type of planning begins with a very careful and thorough programming effort in which the needs of all relevant users are identified

and quantified, and functional relationships between facility elements and adjacencies are defined.

As with strategic planning, facility programming is an iterative process. As space needs are identified and adjacencies determined, the program is continuously tested and revised to reflect the most efficient use of space. Having initiated this "front-loaded" planning process, the institution should expect to have a thorough understanding of what the facility should look like and how much it will cost well in advance of the architect and general contractor being hired and the first bricks being laid.

A successful facility planning process also involves selection of a competent and responsive development team -- architect, consultants, contractor -- through some form of competitive process. All too often these selection efforts -- particularly for the contractor -- take place too late in the development process. By bringing the contractor in early, the university or college is able to integrate a program of value engineering at the front end of a project, thereby increasing potential savings during the initial development phases rather than relying on forced savings during the construction period.

Funding

Critical to the successful development and consequent operations of university and college facilities is the means by which they are financed. There are five traditional sources of capital. The first is state appropriations, generally relevant for almost any public institution and rare for private institutions, although, in some cases, private institutions do receive some amount of per capita appropriations funding. Second, of course, is federal money. Third are private donations, which consist of grants from foundations and other private parties. The fourth is debt financing, of which tax-exempt and commercial debt are the traditional mechanisms through which colleges and universities undertake most of their projects. And the fifth type of capital is developer financing.

The pool of traditional funding sources has been shrinking. In the late 1980s, the percentage of capital costs covered by state appropriations began to decrease, and the current expectation is that these resources will only become more limited -- at least in the short-run. Between thirty-five and forty states have been forced to cut their budgets for higher education programs this year. A similar trend holds true for federal funding; for the most part, traditional funding programs are decreasing. The only increases are in special line item appropriations which are far from the consistent and steady

source of funding on which institutions and their real estate managers can rely.

The third type of funding -- contributions -- does not appear to be a reliable source for universities either. Trend data indicate that contributions for university capital programs decreased in 1988 and increased in 1989. Given the current recessionary nature of the economy, it is highly unlikely that donations will be a source of increased funding for universities in the near future.

In light of the fact that traditional capital sources for universities and colleges -- state and federal appropriations and donations -- are shrinking, institutions in the 1990s will be called upon to tap into less traditional forms of funding in order to continue the successful development and renovation of their facilities. The result will be an increased reliance on creative institutional debt financing and developer financing.

Debt Financing and Innovative Off-Balance Sheet Financing Mechanisms

The two primary forms of debt financing are through commercial and tax-exempt financing. Commercial financing is provided by a private lender -- a bank, insurance company, or pension fund-- for the purposes of building a project. In securing commercial financing, the university goes through all of

the traditional exercises that any borrower undertakes when he/she goes to similar sources of funding.

Tax-exempt financing is debt for which the borrower's interest payments are exempt from federal income taxes. Consequently, this source of debt is typically less expensive than commercial debt and represents a significant financing opportunity for universities and colleges interested in developing facilities cost-effectively.

Whereas private lenders issue commercial debt, the issuer of tax-exempt financing must be a public entity. The traditional issuers for public and private institutions are a state, a city, and certain public authorities or corporations. Additionally, a "63-20 corporation" is a nonprofit corporation that may issue bonds on behalf of a state or local government. It is this latter type of entity that offers interesting opportunities for public universities. For example, issuance of tax-exempt debt through a "63-20 corporation" may allow a public university to avoid some of the burdensome state regulations for development processes -- e.g., long gaps between feasibility studies and project authorization, competitive bidding rules -- that add a quagmire of red tape and unnecessary costs to a development project.

Potential users of tax-exempt debt include both public and private colleges and universities. As users, private institutions are faced with a $150 million tax-exempt bond cap whereas public universities and colleges are not. This represents a tremendous opportunity for public institutions, given that tax-exempt financing is by far the cheapest way to finance any project. Public universities are also sometimes able to create related entities to act as the "user" of the debt. On the other hand, for private institutions the user might be the institution, a foundation created by the institution or a special-purpose 501(c)(3).

Known as "off-balance sheet financing," a university or college's ability to issue and/or use debt through some kind of independent entity -- whether it be an instrumentality, a "63-20 corporation," or a foundation -- often provides the institution with numerous benefits. For public institutions, the advantage may come from circumventing unnecessary government regulations in the development process, thereby allowing for a more efficient and cost-effective process. It may also allow an institution to maintain control over potential net income generated through the project which would otherwise have to be returned to the governing authority.

In conjunction with the creation of an independent entity, revenue bonds rather than general obligation bonds may be used to increase the potential success of off-balance sheet financing. General obligation bonds require that the full faith and credit of an institution back the debt, thereby requiring its inclusion on the balance sheet. Revenue bonds, on the other hand, are backed by the revenue stream from a proposed facility and by other institutional commitments and, therefore, do not necessarily require the institution's credit backing. As a result, this off-balance sheet mechanism may not encroach on the institution's debt capacity, thus allowing it to remain flexible and to address other financing needs as they may arise with more traditional means (e.g., general obligation bonds).

Certificates of participation are another candidate for off- balance sheet financing for public institutions. This mechanism can be used to lease facilities from an outside developer on a tax-free basis while possibly avoiding limitations on the issuance of public debt. Regardless of the means, in order to be successful, the off-balance sheet approach requires that an institution provide a sufficient amount of comfort to those providing capital that the bonds (or other financing tool) being used are fully supported absent a pledge of the general credit of the institution. This approach -- complex as it may be -- can be very effective and is increasingly being utilized

for various types of revenue-producing college and university facilities.

Other Innovative Solutions

It should also be noted that, from the user's standpoint, certain debt will only qualify for tax-exempt status if ninety-five percent of the bond proceeds (ninety percent in some cases) are devoted to the institution's uses. Stated another way, if more than five percent of a facility financed with tax-exempt debt is used by private parties outside of the university, the debt may not maintain its tax-exempt status. Often, institutions are faced with the need to attract outside users in order to generate higher net income in order to operate the facility and service debt. A university or college can address the ninety-five percent rule innovatively by financing the facility through a mix of tax-exempt and commercial debt. For example, Tulane University's new recreation facility employed this financing approach and was able to take advantage of the "cheaper money" available through tax-exempt financing while, at the same time, increase its net revenues through the participation of outside users.

Finally, the concept of "phase outs" has generated increasing interest. It is borrowed from the private world and is of far more importance to private institutions, in particular,

because of their caps on tax-exempt financing. As a general rule, revenue-generating facilities such as student housing will, over time, produce net operating revenues. Thus, while it may be critical to finance the facility with tax-exempt debt during its first years of operations, increasing net revenues may allow the facility to support more expensive commercial debt over time. Private universities faced with the $150 million cap in tax-exempt debt can choose to "phase out" or refinance their tax-exempt debt with taxable debt so that tax-exempt capacity can then be used to finance those facilities -- academic buildings, for example -- that are in particular need of the less expensive financing.

Developer Financing

Developer financing is the final funding category and represents a means by which university facilities are built without the institution directly financing them. In general, an institution will lease land to a developer for a particular facility, whether it is a research building, student housing, conference center, etc. The developer will raise the necessary funds and develop the facility which will then often be leased back -- directly or indirectly -- by the institution itself. The advantages of such an approach, from the university or college's standpoint, is (1) the developer is often more skilled than the institution in building facilities, (2) the developer brings

equity to the transaction, and (3) he/she has the capacity to raise commercial financing. In addition, public institutions can hope to avoid some of the procurement requirements that exist at the state level by following this route.

However, developer financing has its disadvantages. The developer and the university's interests may be very different. For example, equity capital in the early years may come cheaply. However, over time the developer's equity bears a heavy rate of return and his/her interest in increasing this return may raise conflicts as revenues are increased through new charges on various university constituencies. Second, the developer may run the facility differently than would the institution because the developer's interest is more short-term (i.e., maximizing revenues at the expense of facility reserves) than is the university's (i.e., maintaining the facility in a high state of repair). Over time, control issues may arise. Third, the property tax advantage that institutions enjoy on those facilities they own may be lost on the buildings that are leased by the institution. If the cost of property taxes must be covered, it will simply go into the base being paid by the institution or its constituencies.

An additional drawback -- and probably the most critical one -- reflects the inability of developer financing to remain

off-balance sheet for the institution. Often, the participating institution provides a range of guarantees -- occupancy, payment etc. -- to the developer to assist him/her in securing financing. FASB and GASB continue to develop rules that insist upon balance sheet reality and therefore consolidations. In short, these guarantees are often interpreted as a significant financing commitment that requires the debt to be reflected on the institution's statements. Under these circumstances, a critical advantage of developer financing is lost.

Finally, a privately financed building on the whole costs an institution at least 250 to 300 basis points more per year than its own tax-exempt financing will cost. For a $10 million building, that translates into $250,000 to $300,000 in annual charges. The developer must be extremely efficient in terms of building the facility in order for his/her financing approach to be attractive to the institution under these conditions.

The Income Generating Ability of Specific Facilities

Real estate managers traditionally work with three different kinds of facilities in terms of income-generating ability: self-supporting, revenue-neutral and non-sustaining facilities.

Self-supporting facilities are backed by a steady long-term net operating income source. Included within this group are such projects as student housing, dining facilities, parking, recreational facilities, student unions, and book stores. Faculty and staff housing is a new program area for many universities falling under this rubric, but one of growing importance as the competition for faculty continues to increase. In addition, alumni-retirement housing appears to be emerging as a significant area for institutions that own land and are attempting to utilize that land in a way that is institutionally-related. Each of these facility types is intended either to be self-sustaining from the outset or to suffer small losses in the initial years of operation, but to generate net operating income over time.

Revenue-neutral facilities show very little net income or net loss over time. Research facilities represent a primary example; in terms of direct and indirect recoveries, research facilities should generate a sufficient amount of income to pay for the cost of financing and operating the space being used. These facilities obviously represent some degree of risk because the level of research dollars does not always remain consistent each year. However, in general these buildings can be planned and managed on a revenue neutral basis.

The most difficult of the facilities to fund and support -- especially in today's world as an institution's traditional dollar sources are being cut back -- are academic, administrative, and conference facilities. These projects should generally be considered non-sustaining facilities because they are not income-generators. In fact, they often require allocation subsidies from the remainder of the institution in order to survive.

Financing Non-Sustaining Facilities

In terms of non-sustaining facilities, determining funding sources for them remains the critical issue. In those cases in which traditional sources -- government appropriations, a state lottery, etc. -- are not available, university real estate managers must embrace particularly innovative approaches to ensure that needed facilities are built and maintained.

The first approach for addressing these facilities is the use of net income from a self-supporting activity to finance a non-sustaining facility -- a "match-up approach." For example, student housing operated wisely and financed through an off-balance sheet technique should be profitable and able to provide funds to support more needy projects. While it is often viewed as a problem to use the revenues students pay for housing to support other activities, approaching the problem not as a

philosophical one but in terms of the function of the facilities and how they relate to the students being taxed may offer a more productive approach.

A hybrid case is for an institution to build a particular facility -- perhaps an office park or even housing -- for the express purpose of generating a revenue stream to support other facilities. One way to use that revenue stream is to pledge it against the financing of those types of facilities that are to be supported.

Grants, too, offer an opportunity for dealing with this problem. In today's world, a university or college will rarely raise sufficient monies from any one donor to build a facility. However, raising a portion of the cost of a facility, when combined with other funding sources, may make a previously non-sustaining facility capable of supporting its own debt.

Another technique emerging in states that are reluctant to fund lump sum capital appropriations is the provision of annual appropriations for debt service. In other words, instead of funding a $10 million facility, a state may be more willing to provide $800,000 annually as a debt service fund. States are more prone to take this approach if an institution can demonstrate that it will -- over the course of the facility's

operations -- pledge additional funds raised through other activities it is undertaking to the project, thereby allowing the state to decrease its commitment over ten or twenty years. This technique allows the state to phase out its funding over time.

Finally, the investment of endowment is another unique approach to dealing with this problem. Traditionally, endowments are viewed as almost unrelated to the universities they support. Their trustees typically view the investment strategies they select as divorced from institutional needs -- except to the extent that investment income is later committed to the operating budget. But why must this be so? If by building a facility a university can attract scholars who will, in turn, bring research dollars with them, more and better students may be attracted and the institution will be financially advantaged. By broadening the endowment's investment criteria, trustees of the college or university can consider the use of endowment funds as an investment pool with the institution's own facilities as possible investment targets.

Model Programs

The University of California, Irvine has developed an innovative faculty housing program consisting of ownership and rental units. The original intent of the program was to recruit and retain faculty. The housing development is a revenue

generator and a very important program in terms of achieving the goals set for it. If the University of California were willing to commit more land to this project, its revenue-generating capacities could be increased because of consumer needs and because of the techniques that have been used. By undertaking a land leasing program, the housing was originally offered at about thirty percent below market. In today's world, these units represent a controlled commodity; the price only appreciates according to the speed with which external indices increase. By controlling development and taking land out of the equation, these units are now roughly fifty percent below the market price. From the standpoint of the University, this has proved to be a very viable use of land for institutionally related purposes. It has also proven to be a revenue-generating effort.

The recreation center developed by my firm at Tulane University not only broke even from the outset but has made money over time. It is a facility that was built partially with tax-exempt financing and partially with commercial debt; it has outside as well as institutional users. It looks not like a traditional recreation center, but more like a research facility.

Conclusion

A recent report of the Carnegie Commission found that a prospective student's decision to matriculate at an institution

was probably as much influenced by the institution's physical character as its academic life. In today's highly competitive world, colleges and universities must be prepared to meet this development challenge.

To do so will require the use of new and exciting financing techniques. Of equal importance, institutional managers must be prepared to create rational strategic planning approaches that tell them and their institutions when and how to employ these techniques. It does not suffice to be financially astute; political wisdom and institutional perspective are equally crucial ingredients for colleges and universities prepared to explore the new horizons of facilities development and management.

Campus Planning

Clinton N. Hewitt
Associate Vice President, Physical Planning
University of Minnesota

The title of this Institute, Facilities Finance in Higher Education, suggests the important, indeed, critical need to carefully plan for the renovation or new construction and the use of campus facilities. Such planning must be comprehensive and integrative - academic, financial and physical (facilities) must be fully blended in an on-going cycle if an institution expects to maximize its return on the investment of its capital resources. In an era of increasing competition for limited resources, institutions of higher education must plan well to obtain funding for capital construction.

Cost effective facilities planning is very difficult to achieve on a disjointed, incremental, project-by-project basis; however, it can be achieved if projects are developed within a specific planning framework. The concurrent development of a physical plan to guide either the rehabilitation, redevelopment or new construction of facilities is a cost-effective first step in initiating the comprehensive institutional planning process.

During the past few years the "planning process" has been described by many frequently sophisticated terms - Long Range Planning, Tactical Planning, Strategic Planning to Environmental Scanning. Despite the often complicated description of the process, some in very eloquent terms, I tend to reduce the process to answering three basic institutional questions:

1) Where am I?
2) Where do I want to go?
3) How do I get there?

Since the basic purpose of physical planning is to ensure that all elements of a campus environment, both built and natural, are in harmony with each other and respond to the goals of the institution, they should be approved and follow campus standards and guidelines whenever a decision requiring physical change is contemplated.

To respond to the question "Where am I?", there is need for a critical assessment of existing conditions. This requires an evaluation of the quality (condition) and order of existing facilities and should express such conditions in terms of its achievement or failure to achieve previously adopted goals and objectives. The second phase of the planning process would translate the assessment of the existing conditions into a reaffirmation or modification of the goals to provide new direction for planning. This would answer the question "Where do I want to go?". The third phase, conceptual planning, provides the general framework to which implementation must conform and would answer the third question, "How do I get there?". Opportunities for preservation and change for an existing facility or new construction can be easily identified. The capacity for development can be quantified and the utilitarian aspects of the plan can be deferred.

LONG RANGE PLANNING

It is far more important to establish a planning process than to produce a specific campus plan which in many cases will become obsolete before it is returned from the printer. That is why I emphasize that the process is more important than the product (the plan). Too many campus plans are product-oriented and basically fill a spot on the shelves of the campus planner or the institution's administrators. They simply cannot provide the flexibility to address changing needs and an unpredictable future. Such plans were not so important during periods of plentiful resources because funds were available to correct mistakes. However, as I stated earlier, during this period of very competitive, limited resources, the dynamic approach (process) is more central than ever before.

Let me emphasize at this point that there is no standard formula that will guarantee successful planning. The process for your institution because of its unique set of circumstances will vary from your colleagues. An assessment of the unique characteristics of your institution will, however, allow you to organize the planning process to effectively guide the development of your campus.

The graphic on the following page illustrates the approach to long range planning at my institution and I want to quickly describe the basic steps or components of this process.

The Tactical Report is the first step in initiating a comprehensive long range development plan as part of the planning process. It serves as a general outline for the planning process, detailing the work tasks and identifying general issues and decisions that must be resolved early in the planning sequence. In simplest terms, the Tactical Report describes the overall work program.

A unique aspect of the "process" oriented plan is its promotion of participation by the user. Therefore, a key element of the Tactical Report is the identification and resolution of issues that are generated by concerned groups and individuals both inside and outside the University.

The **PLANNING BASE INVENTORY** is the second step in the planning process. It documents current conditions and provides the basic data for the future phases of the process. It includes data on building systems, landscape and natural systems, transportation, services and utilities, housing, social recreation and commercial facilities, population and space predictions and program relationships.

The third step in the process, **ANALYSIS AND PLANNING** recommendations, represents the focal point of the planning process. It involves the analysis and evaluations of the information that has been assembled and the development of planning goals and objectives. It requires the development of planning criteria and strategies that will shape the physical content and organization of the campus.

The refinement of the planning policies and directives and the development of the **FRAMEWORK PLAN** is the next step in the planning process. The term "framework" is used to identify that part of the plan which will primarily function as the general guideline mechanism for the future development of the campus. It includes the strategies, design criteria and development options for physical planning. The strategies, criteria and options are related to a set of planning horizons and a broadly based system of user participation. An important aspect of the framework plan is that the actual physical forms should not be given detailed consideration until the time of implementation. This will keep the plan and its options open within the context and restraints of current conditions and allow for the maximum adaptation of unforeseen conditions or changes.

The final step in the planning process is the **MONITORING AND IMPLEMENTATION OF THE PLAN.** This is an internal, self-evaluating planning mechanism that integrates the function of the various offices that are to be involved during the implementation stage. It includes the evaluation of the physical implications

Campus Planning Process

1 Outlining the process
1. Identify scope & context of planning project.
2. Identify interest groups.
3. Identify general issues.
4. Develop time/task framework.
5. Establish management procedures.
6. Initiate planning base for inventory work.

2 Assemble academic and administrative planning data
1. Develop enrollment projections.
2. Develop space utilization data.
3. Develop space need projections.
4. Develop financial projections.
5. Predict future academic and administrative structure.
6. Identify future departmental and program relationships.

3 Assemble utilization data
1. Inventory existing space.
2. Develop computer program for data analysis.

4 Assemble planning base data
1. Conduct issue analysis.
2. Inventory natural and ecological systems.
3. Inventory support systems.
4. Inventory movement systems.
5. Inventory existing academic relationships.
6. Conduct character analysis of existing campus environment.
7. Develop format for presentation of data base information.
8. Prepare planning base inventory document.

5 Facilities utilization study
1. Determine efficiency of facilities utilization on campus.
2. Develop methodology for ongoing space management.

6 Formulate planning framework of land use and circulation
1. Briefing and study organization by consultants.
2. Assemble and analyze base information, issues, and existing goals and policies.
3. Develop and test alternative planning guidelines.
4. Coordinate planning guidelines.
5. Develop and test land use and circulation plan alternatives.
6. Coordinate planning framework.
7. Print draft report.
8. Present draft plan to state legislature or other body.

7 Refine planning policies and framework
1. Reevaluate planning goals, policies, & framework plans.
2. Finalize recommended policies & framework plans.
3. Establish procedures for implementation & monitoring of plan.
4. Prepare final LRDP document.
5. Present LRDP to all appropriate interest groups.

8 Decisions on implementation
1. Adopt or revise recommended plans.
2. Implement policies and plans.

9 Monitoring and implementation of plans
1. Evaluate effectiveness of policies and plans.
2. Revise goals if major changes occur.
3. Revise policies if major changes occur.

of academic and administrative decisions, the means of integrating the design of specific project solutions within the context of the overall planning goals and objectives, and a structure for continuously updating the framework plan based upon feedback and new information. The management of the planning process is very critical to achieving solutions that are consistent with the mission of an institution. This requires the establishment of series of levels of controls, the first being a periodic major presentation to the administration. The second level involves regular review of projects by an Office of Physical Planning or in the care of a smaller institution, a long range campus planning committee. The third level of control takes place through a periodic self-review at the institution's departmental level. An appropriate network of communication between these three levels of control is important to keep the planning process organic and alive and to prevent a transition to a static plan.

MASTER PLANNING FOR FACILITIES

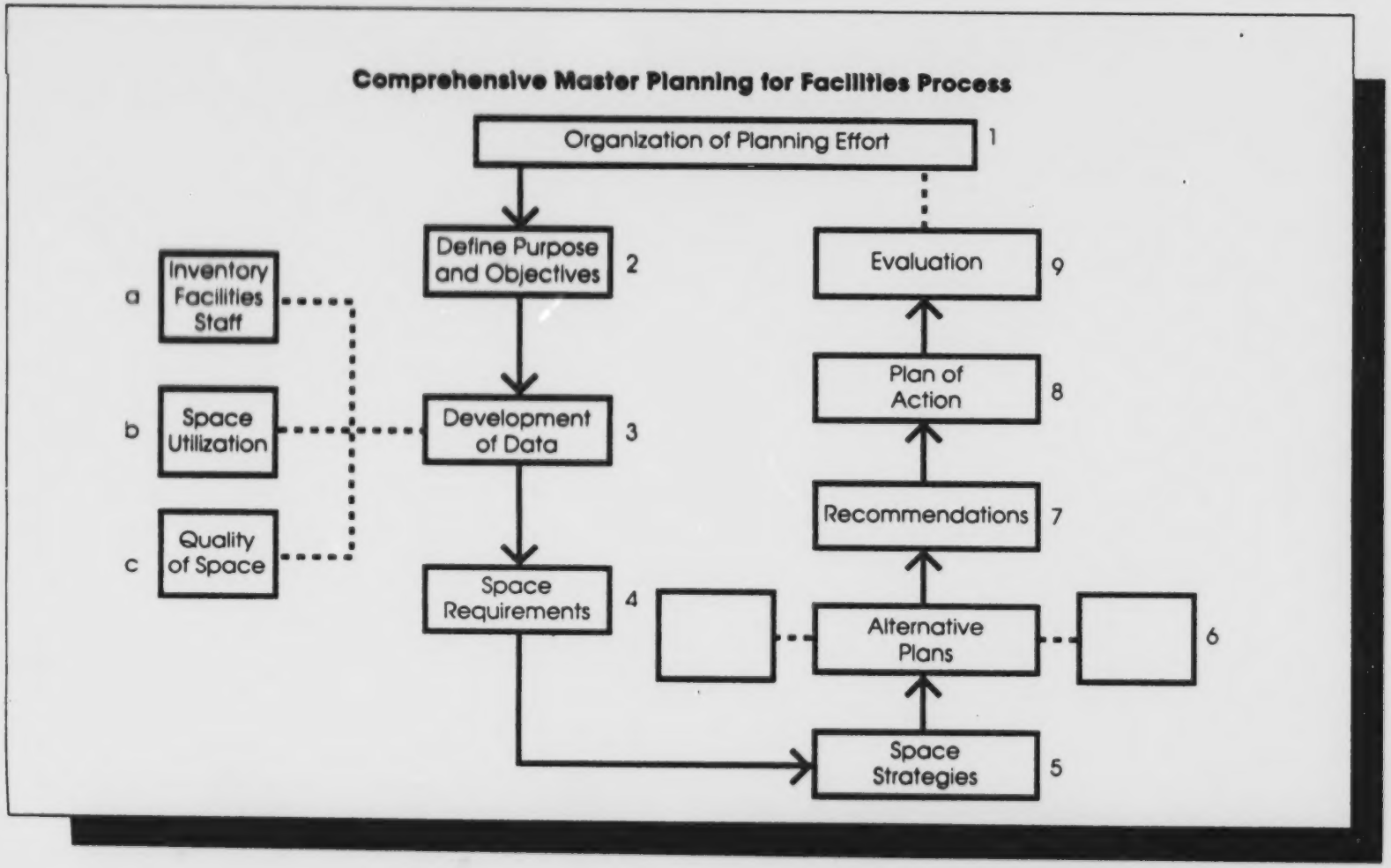
With a long range planning process 'in place', it's easy to make the transition to the planning effort to develop facilities (buildings) that are consistent with the long range goals of the institution. Again, the emphasis is on the development of facilities that support the academic plan (objectives) of the institution. It cannot be overly stressed that the successful development of facilities can only be achieved if the institution has defined its academic plan or priorities. The <u>foundation</u> of successful facility planning is the academic plan of the institution. Let me emphasize that an objective of developing facility via organized process is to minimize errors and to maximize the return on the dollars invested. There are essentially nine basic steps in the process (see graphic on next page) and I will briefly describe the activities that take place in each of these steps.

1. Organization of the Planning Effort.

   The initial step involves the appointment of a team or committee that is given a general charge to coordinate the planning effort toward the objective to develop facilities. Such committees typically include the user group (faculty, staff and students), the planning staff and representatives from Physical Plant. Usually a committee of 5 to 7 persons is the most ideal size.

2. Define Purpose and Objective.

   After a committee or team has been appointed, it must accomplish a number of steps: (1) the committee or team should establish its goals and objectives based upon the charge it has been given; (2) the schedule to complete the study should be defined; (3) the identification of the need for additional staff or outside consultant


Comprehensive Master Planning for Facilities Process
Organization of Planning Effort
1
Define Purpose and Objectives
2
Development of Data
3
Space Requirements
4
Space Strategies
5
Alternative Plans
6
Recommendations
7
Plan of Action
8
Evaluation
9
a
Inventory Facilities Staff
b
Space Utilization
c
Quality of Space

assistance, and (4) assignments to individual members of the committee.

3. Development of Data.

Various information must be collected for the committee, including a current inventory and utilization of facilities, the investigation and evaluation of existing conditions (i.e., physical condition of structures, utilities, handicapped access, expansion, etc.), the approved academic plan, student credit hours, research level, size of faculty and staff and funding resources. Information on space utilization is very important. Public institutions frequently have difficulty obtaining capital funds because they are unable to respond adequately to questions from the legislature on how much space is needed and how well space is being utilized.

4. Space Requirement

With adequate information on the program of a department, it is necessary to determine the amount of space required to accommodate the academic program. The amount of space needed can be determined by using the institution's space standards or by applying a facilities model. This information is used for comparison with existing spaces and should be supplemented with an evaluation of the qualitative needs of the various programs.

5. Space Strategies

The space needs of a program can be met in a number of ways. A reorganization of the existing space could yield sufficient space to accommodate the expansion needs of a program. If the space need is short term, the leasing of space off-campus should be explored. The renovation and upgrading of existing facilities is an option to meet the facilities needs. If the previous alternatives will not solve the problem, then the construction of new facilities could be the answer. Before implementing this final step, the institution must absolutely ensure that other facilities are not available or can be renovated, the activity to be housed is important to its mission and the cost can be defended.

6. Alternative Plans

It is best to prepare several plans for consideration by the committee or team. Remember, at the conceptual stage, there is no way to determine a precise plan that will meet all of the needs of a program in the most cost-effective way. Generally, there are a number of solutions that respond to the various space strategies. In the public setting, this is an important approach, because space decisions are frequently challenged. Since the process operates under a specific time-frame, it's important to realize that it is impossible to consider all of the possible alternatives. Therefore, the committee or team must decide on the alternatives that will be explored in greater detail in preparation for recommending a 'plan' to the institution's decision-makers.

7. Recommendation

While the process requires cooperation and compromise by committee members, this step requires the highest degree of unity. Also, at this stage, the assistance of professional staff or consultants to analyze and present detailed solutions is required. The committee must decide among the various options the solution that will be developed into a Plan of Action.

8. Plan of Action

The Plan of Action is really an implementation strategy requiring adoption by the institution. The major components of a Plan of Action are space strategies, steps the institution must take to reach completion and funding strategies. The Plan of Action becomes the map the institution will use to obtain funding for the construction of facilities.

9. Evaluation

As stated earlier, there is no method or procedure that will guarantee the development of solutions to ensure success in facilities development. Therefore, it's important to consistently evaluate the process so that changes can be made to improve the competitive edge for seeking support. At the end of the process, the committee or team is in the best possible position to evaluate and recommend changes to strengthen the process.

RANKING CAPITAL PROJECTS

The establishment of priorities for capital projects is both an art and a science, and one that may eventually employ intangible factors such as the view of distinguished campus academicians, the judgment of senior administrators, impact of community sentiment and, sometimes, the influence of donors. Each criterion for ranking capital projects, although listed in the following order of importance, could be assigned different values before applying them to each capital project to determine its final ranking.

Criteria for Ranking Capital Projects

1. Projects that will eliminate health, fire and other safety hazards, including architectural barriers to the disabled.

2. Projects that are consistent with institution-wide goals and academic planning objectives that incorporate currently projected student, faculty and staff levels.

3. Projects that are developed under a "phased" concept (i.e., a three-phased development of a recreational complex) where funds are initially allocated for one phase of the development.

4. Projects that provide a "cost avoidance" in operation through energy conservation, improved maintenance and improved utility systems.

5. Projects that serve a broad range of campus constituents rather than a single department (i.e., basic sciences, or library vs. materials engineering).

6. Projects for which matching grants from non-state sources are available to partially finance the project, projects supported by donors or self-amortizing projects.

7. Projects which are compatible with the campus long range development plan (i.e., historical preservation, campus beautification).

While it is important to employ criteria as a testing mechanism, in the final analysis, the priority selection of projects is a "sorting out" process that must take into account other factors and policy decisions. It, of course, would be difficult to argue that a health, fire and safety hazard project should not be given top priority. However, the weighing of other factors, such as academic objectives can move them closer together.

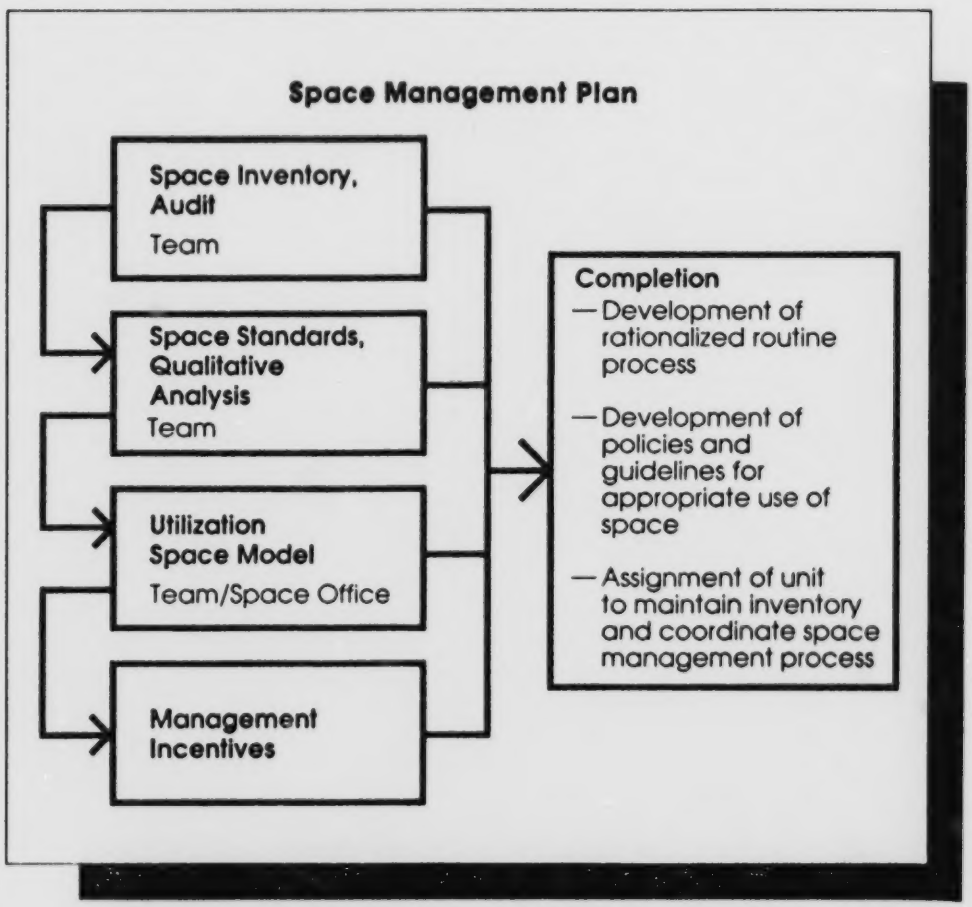
SPACE MANAGEMENT

The demand for more effective allocation and utilization of University facilities by institutional officers, governing boards, state legislatures and the general public has remained high on the agenda of those responsible for managing campus space. Institutions must give the same level of coordination to facility and equipment resources as they do to personnel and financial resources to achieve its goals and objectives. Simply stated, Space Management is the process an institution employs to determine what space exists (inventory), how it is being used (utilization), what space is needed (projection) and how to meet space needs (plan implementation).

The development of a Space Management Plan (see graphic on the following page) is an approach that would permit an institution to systematically respond to the questions raised in the definition of space management. As the graphic indicates, the traditional methods of evaluating the capacity of institutional facilities and projecting future needs is expanded to include qualitative analysis and management incentives.

It's very important that an institution determines who will be responsible for maintaining a space management process before developing a plan. In the past, the responsibility has varied from individual departments to space czars to committees to a space management office.

Clearly, the most effective space management approach is to appoint a space czar to make all decisions. In effect, you would create a dictator having no one to answer to except perhaps the President. There aren't many, if any, space czars left in Higher Education, and that role has evolved into a space advisor or mediator. If funding is available, an Office of Space Programming and Management or a similar type unit should serve as the locus of activities in the collection assembly and analysis of space data. Ideally, such an office can assist decision-makers in identifying problem areas and providing options to resolve space problems. The responsibilities of such an office include, (a) maintaining a campus-wide space inventory, (b) annually auditing all rooms, (c) maintain space standards and (d) provide support to academic and administrative units in resolving space issues.


Space Management Plan
Space Inventory, Audit
Team
Space Standards, Qualitative Analysis
Team
Utilization Space Model
Team/Space Office
Management Incentives
Completion
— Development of rationalized routine process
— Development of policies and guidelines for appropriate use of space
— Assignment of unit to maintain inventory and coordinate space management process

The first task in the SPACE MANAGEMENT PLAN is the development of an up-to-date inventory. The accuracy of space data is very critical to successfully managing space. It is a continual data-gathering process achieved by auditing buildings. Information gathered can vary from the very sketchy to the very detailed. Regardless of the level of collection, accuracy is most essential. It's accomplished on a building-by-building, room-by-room basis. The minimum information on each discreet space would be an identifying room number, area, user department and programmatic use. Other information can be collected but unnecessary details can make the process too cumbersome. The space inventory/audit process illustrated can be implemented by office staff with a person(s) assigned by the department being audited. Ideally, a space audit should be carried out on an annual basis, but at least every two years.

To evaluate the amount of space required for a specific program requires the development of space standards. Standards may be defined as the average assignable square feet of a given type of space considered adequate for each kind of activity at an institution. It's important to realize that space standards cannot be uniformly applied across departments or colleges because resources and programs vary considerably. Standards require considerable time to develop and it's absolutely essential that input from the faculty is obtained.

Too frequently, the quality of space is not taken into account when judgments are made about the needs of a program. Often information on quality is unknown and cannot be applied appropriately. An investigation of the quality of space should take into account its location, shape, air quality, acoustical properties, aesthetics and historical value. The inclusion of architectural/environmental factors would bring numeric space standards into the "real world" of the institution.

With the establishment of space standards, utilization studies can be undertaken to assist decisions on changes in allocations and scheduling. Such studies can be accomplished by (a) comparing the allocation of space with a similar department or institution, (b) comparing guidelines with theoretical allowances generated by other systems, or (c) creation of a space model - one especially constructed to reflect the teaching, research and service mission of the institution. At the University of Minnesota we developed a facilities model which is comprised of four components:

- The Inventory Component encompasses not only the space inventory as described above, but also a classification structure and accounting guidelines which dictate the form and content of space information.

- The Qualitative Component addresses the physical condition, suitability, location and handicapped accessibility of the existing physical plant.

  The Predictor Component identifies input information on which space needs and utilization are calculated. The Guideline Component outlines the actual standards by which the level of space usage or need are determined.

- Finally, the Implementation Component describes how the MFM will be refined and applied.

The model is viewed as an objective tool to managers in assessing current space utilization and projecting future space needs. If enrollments rise or fall, the model assists decision-makers in re-configuring space allocations to accommodate shifts in program demands.

Again, it should be emphasized that the creation of standards, a space model and the execution of utilization studies must involve the faculty and the staff. With a space model, implementing utilization studies simply requires the collection of program data and the application of the data by the office staff to the model. In this regard, it is also important that persons conducting utilization studies be thoroughly knowledgeable about program requirements and that the evaluation criteria is acceptable to the users of the spaces being surveyed. There are essentially two questions utilization studies are concerned about: (1) Are optimum numbers of persons occupying a space, and (2) is optimum use being made of the space?

The 'heart' of a space management system is the method of allocating space. The decision-maker for allocating space varies from campus to campus. Sometimes space is controlled at the Vice-President level, others at the dean's level and, in many cases, at the departmental level. A primary issue is how to achieve optimum allocation and use. If a department has excess space, what would motivate that department to share or release unused space? Normally, the highest use is achieved when inadequate space is available. Therefore, some method needs to be established to encourage the "controller" to manage the space in the most effective way. Different techniques have been explored, including space costing, space rental, and space purchasing. Regardless of the incentive developed, it is generally found that the space allocation process is more acceptable to the faculty and staff when policies and procedures are developed with the participation and concurrence of the faculty and staff and that such policies are clearly communicated to the entire campus and they are fairly implemented.

As stated at the beginning of this presentation, we have been operating in a period of increasingly limited resources--both capital and operating--one never before experienced. This presents a number of clear signals that have been clearly identified and written about by many persons involved in campus planning, space management and the design and construction of campus facilities (Bareither, Kaiser, Probasco, Griffith, Cavanaugh, Fuller, etc.).

First, we must find ways to achieve more with the capital dollars available by shortening the planning time for the development of capital projects. It might be useful to explore the creation of consortiums under which institutions could consolidate their building programs and possibly attract lower bids. We should also explore ways to interest and involve the construction industry in finding new ways to solve programs.

A second signal is that facilities have to be less costly to maintain because of the drain on operating dollars. Planning and designing with maintenance standards focusing on design concepts and the use of materials that reduce the amount of labor for maintenance and housekeeping. Consider the creation of both a building maintenance budget and an energy budget to guide the design of facilities.

Third, we must develop facilities that are less costly to modify (conversion capability) because there is no question that university buildings will undergo many changes during their lifetime. This suggests generic modular construction, the development of utilities on grid systems and the use of a "landscaped" approach to office development. These techniques lend themselves to ready change.

Fourth, I think we must be prepared to do a great deal more rehabilitation and remodeling and less new construction simply because capital dollars will not be so readily available. This presents the problem of what to do with the "old monsters" on the campus and develop ways to use them for educational programs for a number of years instead of erecting new buildings. I am considering a new classification for these old buildings - referring to them as "tenured buildings". Like the problems the academic units face with tenured faculty, we face a similar problem of what to do with old buildings. This can be a real significant problem with historic buildings.

Finally, as I emphasized earlier, we must find ways to make more efficient use of existing space. We must reassign spaces in departments that are "fat on space" and help others who are struggling to meet the needs of their programs. Consideration should be given to changing the customary work week, "mothballing" for temporary low demand, and exploring non-traditional approaches (public-private ventures) to resolve facility needs.

Vanderbilt University Boiler Plant Expansion Report

Jon M. Gullette
Associate Vice Chancellor for Operations
Vanderbilt University

The following report provides a cost/benefit analysis of a power plant expansion at Vanderbilt University in 1985. The report makes a qualitative and quantitative case for the expansion, and was presented to the Vanderbilt University Board of Trust.

On the quantitative side, general data is provided on the existing power plant, as well as summaries of capacity and demand. Of particular interest are excerpts from some of the engineering studies performed and our survey of power plants at selected similar institutions.

The qualitative case includes an examination of our alternatives and the anticipated results of the completed plant expansion. Individual projects are then examined, including cost avoidance figures and payback periods. Our summary and recommendations complete the report.

The original report concluded with detailed charts outlining the financing options, as well as loan amortization schedules. These have been omitted here because of space limitations.

I INTRODUCTION

The purpose of this report is to provide an analysis of the present condition of the primary steam supply system at Vanderbilt University. Recommendations will follow which allow us to confront and contain increases in system loading and understand the impact these load increases will have on our operating expenditures.

It is appropriate to present and discuss these issues at a time when Vanderbilt is positioning itself to achieve even higher ranking among academic institutions in America.

The recommendations contained in this report will enhance our ability to allocate funding away from expenses and toward program and facilities improvements.

II SCOPE

This report provides the reader with a basic understanding of the present operating condition of the equipment and systems involved. It also provides an assessment of the impact of projected load growth.

The mission of the Power Plant is:

> "To provide for the generation and distribution of steam at required pressures and temperatures for the purpose of supporting a variety of student, patient, faculty and staff needs throughout the Campus and Medical Center.
>
> To manage, operate and maintain the systems and equipment that produce steam in the most efficient, effective manner practical."

III DATA AND STUDIES

This section is a tabulation of compiled data concerning capacity of plant equipment as well as present and future loads associated with the systems connected to the Vanderbilt Power Plant.

VANDERBILT UNIVERSITY

POWER PLANT DATA

V.U. BOILER NO.	PRESSURE	CAPACITY (Lbs./Hr.)	AGE (Yrs.)	CONDITION	AVG. EFF.	FUEL
6)	125 psi	100,000	23	GOOD	75%	COAL
5)	125 psi	100,000	23	GOOD	75%	COAL
4)	125 psi	25,000	49	FAIR	68%	GAS/OIL
3)	125 psi	15,000	61	FAIR	68%	GAS/OIL
2)	125 psi	15,000	61	FAIR	68%	GAS/OIL
1)	125 psi	.....	.....	DECOMMISSIONED	.....	.....
TOTAL CAPACITY						255,000

PEABODY*
BOILER NO.

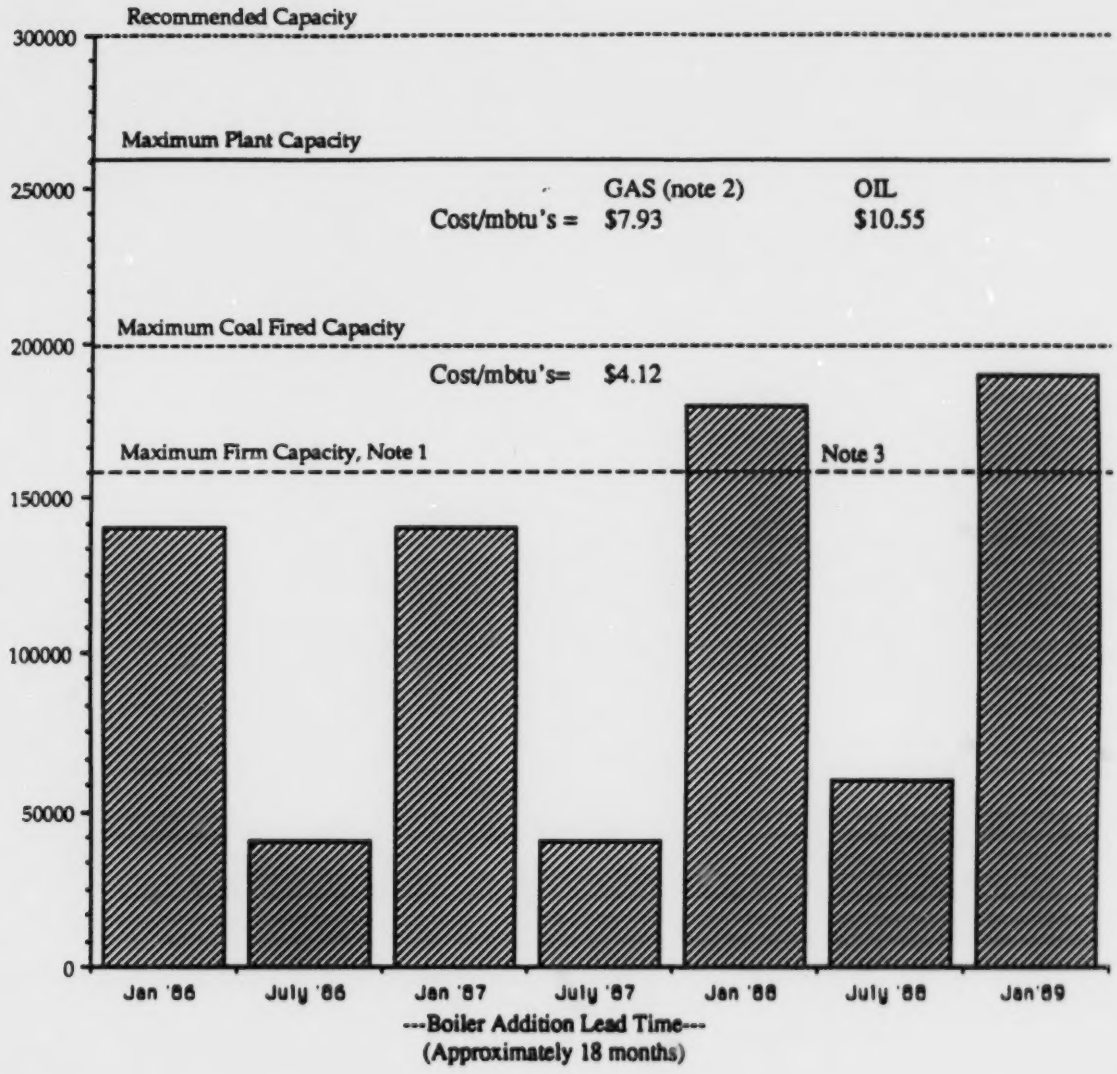
3)	100 psi	21,000	37	POOR	60%	GAS
2)	100 psi	21,000	37	POOR	60%	GAS
1)	.....	.....	.....	DECOMMISSIONED	.....	.....
TOTAL CAPACITY						42,000

* The Peabody plant is a separate facility, in poor condition, which should become another connected load when capacity permits.

AVG. LOADS (IN LBS./HR.)

	EXISTING		PROJECTED (1/88)	
	SUMMER	WINTER	SUMMER	WINTER
MAIN	35,000	140,000	60,000	170,000
PEABODY	2,500	20,000	2,500	20,000

FUEL COSTS 1985	COAL ($/Mlbs.)	GAS ($/Mlbs.)	OIL ($/Mlbs.)	ELECT. ($/Mlbs.)
PURCHASED	$1.61	$5.79	$ 7.71	$14.65
GENERATED	$4.12	$7.93	$10.55	N/A



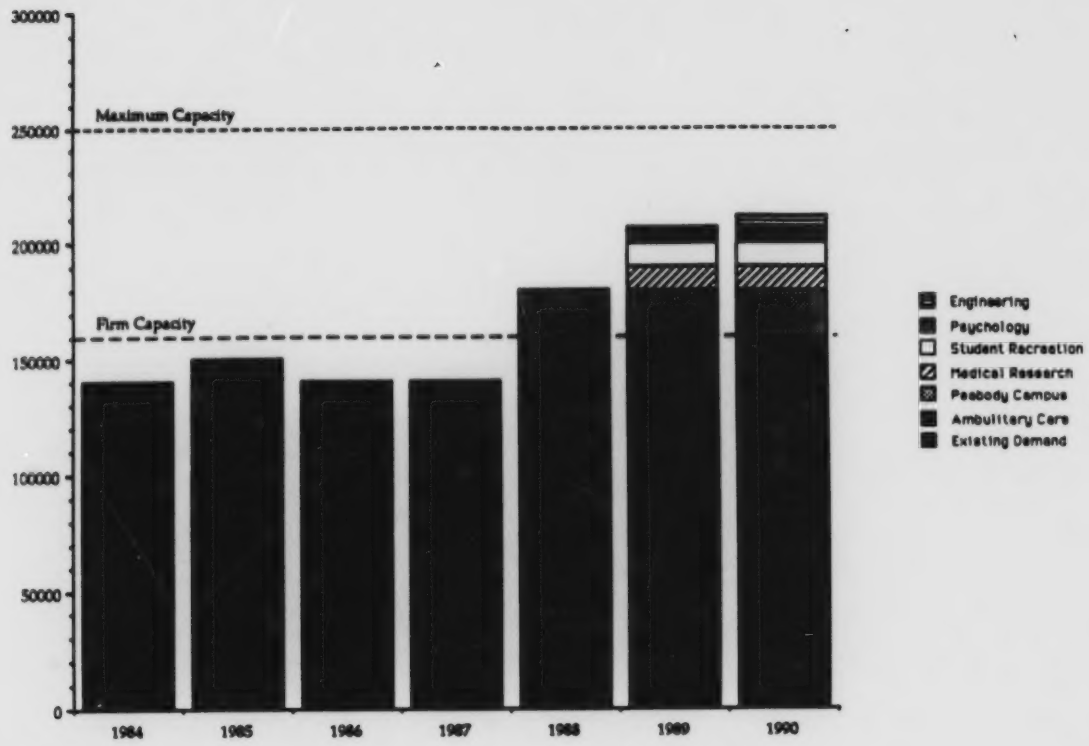
Vanderbilt University Steam Demand

CAPACITY GRAPH/TIME

Existing & Projected

NOTES:

1. Firm Capacity is defined as the maximum continuous steam flow which can be provided with the loss of the largest unit.
2. Natural gas is furnished on an "interruptable" contract and is not considered a reliable source of fuel for emergency use.
3. The addition of the Ambulatory Care Center is indicated as occurring on or about January 1988. It is also anticipated that the addition of a student recreation facility, and a Medical Research Facility, and a Psychology Building will occur at about the same time.



Hourly Peak Steam Demand for Vanderbilt University

Symbol	Represents	Peak Coincident Demand
#	Existing Demand	140,000 to 150,000 lbs./hr.
A	Ambulatory Care	20,000 lbs./hr.
P	Peabody Campus	20,000 lbs./hr.
M	Medical Research	10,000 lbs./hr.
S	Student Recreation	10,000 lbs./hr.
O	Psychology	6,500 lbs./hr.
E	Engineering	5,000 lbs./hr.

VANDERBILT UNIVERSITY

BOILER PLANT SUMMARY

		Lbs./Hr.
1.	Installed Boiler Plant Rated Capacity	255,000
2.	Plant Sendout Capability	255,000
3.	Plant Firm Capacity	155,000
4.	Total Coal-Fired Capacity (Boilers No. 5 & 6)	200,000
5.	Maximum Recorded Plant Steam Demand (Jan. 1985)	147,200
6.	Estimated Peak Plant Demand @ 0 F (by modeling)	165,000
7.	Normal Peak Demand	140,000
8.	Probable Coincident Demand of Ambulatory Care Center*	20,000
9.	Probable Coincident Demand of Student Recreation Facility**	10,000
10.	Probable Coincident Demand of Medical Research Facility**	10,000
11.	Total Projected Peak Demand (Jan. 1988)	180,000
12.	Estimated Plant Base Load To Medical Center	80,000
13.	Medical Center Base Load Including Ambulatory Care & Medical Research***	110,000
14.	Plant Capacity Available for Load Growth	0
15.	Normal Expected Load Growth (Renovations, Additions)	2-3%/Yr
16.	Maximum Peak Load - Peabody Campus	20,000
17.	Firm Capacity vs. Estimated Peak Load (Jan 1989) (#11 minus #3)	-15,000

NOTES:

* Total connected steam load at Ambulatory Care Center is 33,369 lbs./hr. including process requirements.

** The steam demand impact of an additional 80,000 to 100,000 sq. ft. facility is based on the usage profile of similar types of buildings in this area of the country.

*** The Medical Center projected load of 100,000 lbs./hr. indicates that the remaining 55,000 lbs./hr. of plant firm capacity would be the total available for the main campus. This averages out to be roughly 12 btu's/sq. ft. The usual practice in this part of the country is to design for between 35 and 50 btu's/sq. ft.

Examples:	Rand Hall	75 btu's/sq. ft.
	Branscomb Quad.	37 btu's/sq. ft.
	Ambulatory Care	55 btu's/sq. ft.
	Memorial Gym	88 byu's/sq. ft.
	Kirkland Hall	55 btu's/sq. ft.
	Stevenson Center	60 btu's/sq. ft.

VANDERBILT UNIVERSITY

ENGINEERING STUDIES EXCERPTS

1. **OFFICE OF CAMPUS PLANNING – "THE SECOND HUNDRED YEARS" - 2/73**

   Page 34 - "Steam Production System"
   "By generally accepted standards, the firm capacity of the boiler plant is barely within limits of acceptable design practice"

   Page 35 - "These statements reflect the existing situation and the loads that the systems are presently carrying. Neither system was designed in anticipation of it's serving facilities in an expanded campus. Development projects in the property acquisition area will have to include provisions for electric power service and STEAM if needed."

2. **SYSKA AND HENNESSEY, INC. – "A STUDY OF UTILITY SUPPORT SYSTEMS" - 5/73**

   Page IIA-2 - "It is generally accepted that firm capacity of a central boiler plant supplying primarily space heating and small process loads should be at least 66% of total installed capacity."

   Page IIA-5 "Present central boiler plant firm capacity is marginal."

   "The additions of new campus buildings will further reduce the firm capacity of this plant. While the probability is remote, a peak plant load demand due to prolonged severe weather, combined with a simultaneous interruption of gas service, and the requirement to maintain the Medical Center at a base load, would require the shutdown of selected campus residential and academic buildings during this period."

3. **FLACK + KURTZ-"VANDERBILT UNIVERSITY STEAM PLANT & SUBSTATION EXPANSION" – 2/77**

   Page 2 - "With the unavailability of gas in winter and its questionable availability at any time in the future, the present campus is in a very tenuous position of reliability of steam supply. With the planned growth through 1985, dominated by the Medical Center expansion, the reliability of the plant to meet demands is well beyond the bounds of good practice, unless firm steam generating capacity is added."

"In Keeping with the above, the present boiler plant required the addition of 100,000 lbs./hr. of operable capacity to meet the projected loads in 1985."

Page 7 - "During winter operations, the two 100,000 lb./hr. boilers can meet the present design day campus steam demand of 138,000 lbs./hr. If either boiler was down, the total capacity of the boiler plant would be 100,000 lbs./hr. and in order to maintain full services to the present hospital during a failure on a design day (19F) or near design day the remaining campus buildings connected to the steam plant could be maintained at only 50F. In the future as the campus steam load grows with new construction, the problem will grow more serious."

Page 10 - "There is not adequate provision for emergency operation of the boiler plant during power failures."

Page 33 - "We recommend a detailed investigation into the feasibility of installing a solid waste incineration plant on campus."

4. **FLACK + KURTZ - SUPPLEMENTAL REPORT - 3/77**

Page S-5 - Boiler Options "A" - Add (2) new coal boilers. Advantages: Eliminates the dependency on any boilers older than 15 yrs. Provides operating flexibility with coal boilers. Lowest annual energy cost of all options. Disadvantages: Highest first cost of all options.

Page S-6 - Boiler Options "D" - Retrofit (4) boilers for oil firing. Advantages: Lowest first cost of all options. Provides a third fuel for the boiler plant. Oil standby broilers can be brought on line in 1/2 hour. Disadvantages: High annual energy cost premium. Dependence on 38-50 year old equipment.

5. **CAMPUS PLANNING - "COAL GASIFICATION PLANT PROPOSAL" - 6/78**

Part 1 - Technical - Item II - THE NEED FOR PLANT EXPANSION...

Page 3 - "If the present plant remained as-is and a failure of one boiler occurred on a design winter day, the present and new hospital could be maintained with full steam service, but the remaining buildings, which includes residential units for 4,000 students, could only be maintained at 35F. Any plan to selectively control portions of the campus would be virtually impossible to implement."

6. **FLACK + KURTZ – "CHILLED WATER & STEAM DISTRIBUTION STUDY" – 6/81**

Page 27 - "The path of first choice would be to interconnect with the V.U. plant." (Peabody)

7. **MINUTES OF TECHNICAL MEETING NO. 1 - 5/84**

Ambulatory Care Center - Andrew Lappner, FLACK + KURTZ

Item 5.0 - A. Lappner and G. Rainer discussed alternative methods to maintain the steam pressure to the hospital and Ambulatory Care Center. In the event of the failure of a coal-fired boiler, R. Warrick indicated that they could manually value off steam to other sections of the campus while maintaining full service to the hospital and Ambulatory Care Center.

Item 7.0 - R. Warrick indicated that there was no emergency electrical generation service available in the power plant.

8. **POWER SERVICES CO. - "CENTRAL CAMPUS & PEABODY HEATING PLANT REVIEW" - 12/84**

Page 10 - "Although both Vogt boilers (coal) have an envious operating record for availability, it is prudent to assume and to plan for at lease one boiler being unavailable at some time."

"When we consider that units No. 2 and 3 are 56 years old and the norm of boiler life is considered to be 30 years, we become somewhat apprehensive as to their reliability and their remaining useful life. In addition, the total capacity of 55,000 lbs./hr. is not a substitute for the loss of a 100,000 lbs./hr. boiler unit. I believe it is prudent to view the B & W units in terms of limited capacity, questionable life, and, most importantly, questionable reliability."

Page 13 - "The recommendations made by Flack + Kurtz in 1977 for replacement of the B & W boilers with a new boiler is still valid."

Page 14 - "In addition to the above, we strongly recommend that serious consideration be given to installation of a back-pressure turbine-generator."

9. **I. C. THOMASSON ASSOCIATES - "CENTRAL STEAM PLANT EXPANSION" - 1/85**

Page 1 - Executive Summary: 3. "In absence of a Federal Grant, a single traveling grate unit of 100,000 lbs./hr. steaming capacity be installed without gasification capability."

SURVEY OF OTHER UNIVERSITIES

It is often helpful in choosing between difficult alternatives or committing major resources, to have the perspective of how others have proceeded in similar circumstances. Toward this end, we identified eight other major universities with whom to compare Vanderbilt's power plant capacities, demand and future plans. These institutions were Cornell, Duke, Kansas State, North Carolina State, Purdue, University of North Carolina, University of Rochester and University of Virginia. All of the institutions surveyed place a significant emphasis on research; all of the institutions include either a medical center or a veterinary school. The chief operations officer, or his counterpart for utilities, was contacted by telephone to determine the data presented here. The survey results are graphically tabulated as Figure 1, entitled Plant Capacity and Demand.

When we examined the peak steam demand of each plant with respect to their firm capacity the University of Virginia and Vanderbilt showed the least amounts of reserve capacity with their peaks equal to 95% of firm capacity. However, the University of Virginia has an additional 90,000 pounds per hour of capacity under construction and scheduled to come on line in 1987, concurrent with a new hospital expected to add 30,000 pounds per hour to their peak steam load. Furthermore, they are planning units which will add 40,000 pounds per hour in each of two phased replacements. A graphic comparison of Vanderbilt and the University of Virginia, before and after expansion is presented as Figure 2, entitled Projections Following Load Increases.

The next lowest reserve capacity was found at Duke University, where peak demand equals 93% of firm capacity. While Duke has not yet committed to a plant expansion, their administration has recognized the potential for problems by directing their planning and operations department to conduct an in-depth study of twenty alternative means of relieving the capacity shortfall with respect to demand. The alternatives being considered included co-generation, demand reduction through conservation, a simple plant expansion and others. They are in a group of two with Vanderbilt, and the only campuses surveyed who's peak loads exceed 90% of firm capacity without an approved plan for expansion. However, Duke does not have any major steam loads under construction.

The University of North Carolina at Chapel Hill has a peak demand equal to just under 90% of firm steam plant capacity. They are seeking funding for a new plant to replace all boilers over 22 years of age. When complete, the planned expansion would increase capacity by 155,000 pounds per hour and triple present cogeneration ability. An outside consultant was hired to develop UNC's expansion plans.

North Carolina State University had an all time peak equal to 88% of firm capacity, but their typical peak since the onset of energy conservation is only 70% of firm capacity. Their recently constructed veterinary school was provided with its own stand-alone boiler and is not connected to the central plant.

Purdue University reported a peak load equal to 82% of firm capacity. Even with this 18% reserve over firm steam capacity, Purdue is planning a major utility expansion to replace their satellite boiler plant which has boilers of 32 and 46 years of age.

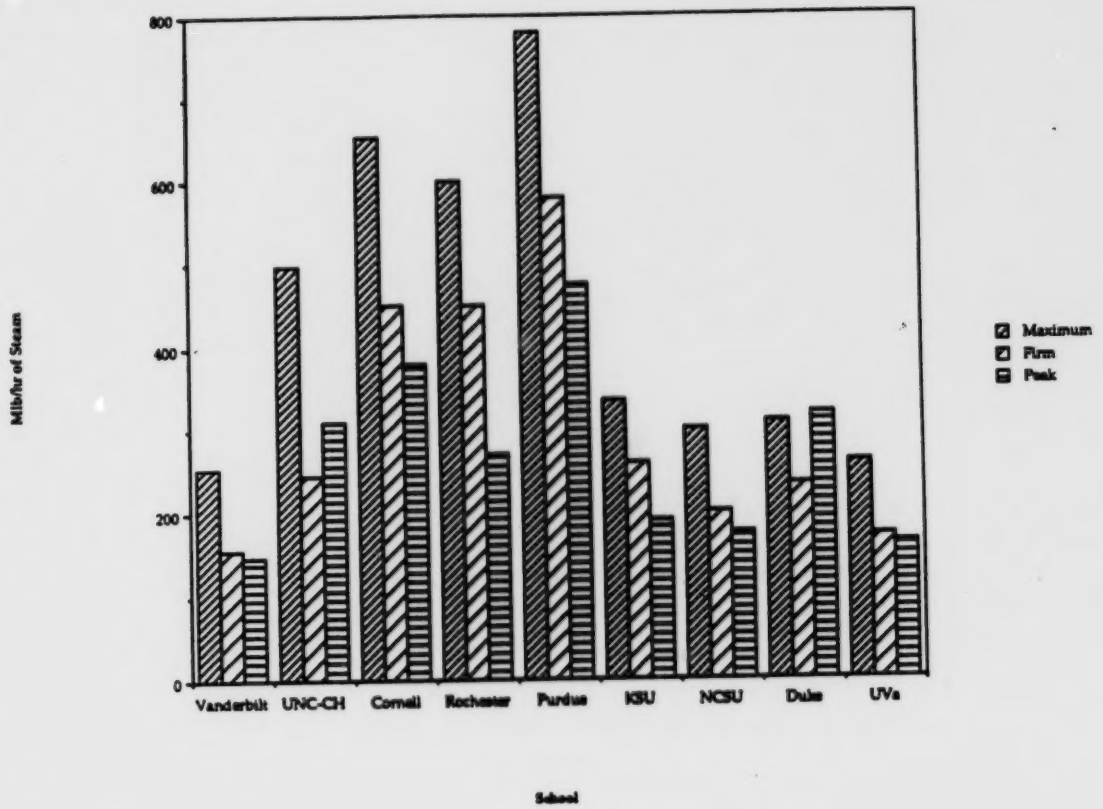
The remaining institutions reported peak loads from 84% to as low as 60% of firm capacity.

All of the planning and operations departments at the schools surveyed subscribe to the principle of firm capacity as we understand it. That is, the maximum capacity reduced by the loss of one of the largest individual boilers. From the survey data it seems apparent that most university administrations also embrace this principle. The sole exception may be Duke University, but the jury is still out on their case.

Where the age of individual boilers is concerned, Vanderbilt again falls outside the normal range encountered in our institutional survey. No institution surveyed had a boiler in operation which approached the age of our 61 year old units. The oldest boilers reported were at three institutions with 46 year old units. Two of these were already planned for replacement at the University of North Carolina and at Purdue. The third 46 year old unit, at Kansas State, could be lost completely and still not drop firm capacity below a 14% reserve, so Kansas State had no reason to be concerned over their oldest unit. The University of North Carolina has units of 22 and 26 years of age planned for replacement. Purdue has a 32 year old boiler planned for replacement. Thirty years is a widely accepted upper limit on the age of any boiler to be counted on for capacity.

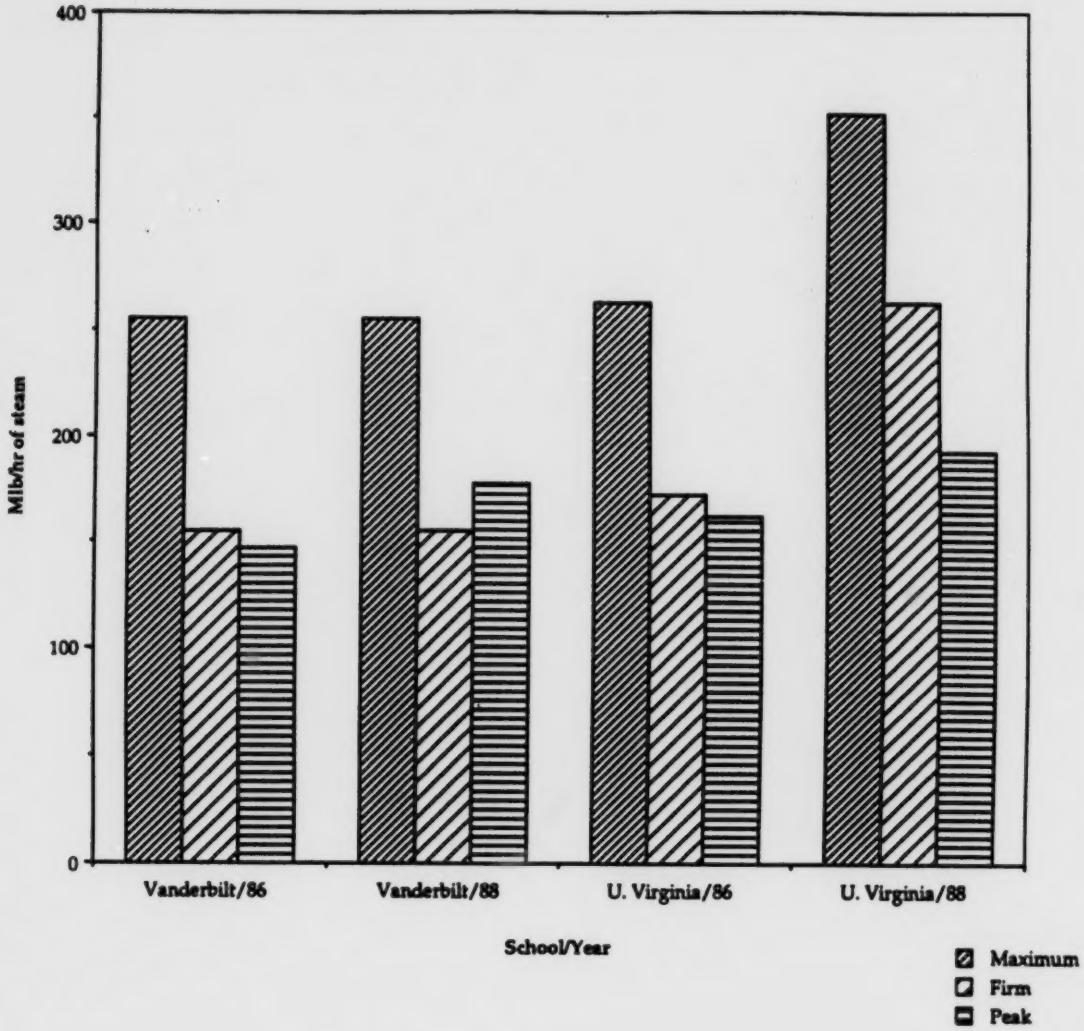
Concerning cogeneration, it was observed that many schools use some form of cogeneration as part of their overall utility plan. Purdue generates 0.75 megawatts using an extraction turbine. Kansas State generates 3.75 megawatts. The University of North Carolina currently generates 10 megawatts and expects to build 28 megawatts as a part of their new plant. Cornell has co-generation under construction which will produce between 22 and 30 megawatts by late 1986. Rochester uses the same principle by generating 160 psi steam to drive turbine powered chillers in a large central chilled water plant.

In summary, we can observe that Vanderbilt University is presently operating the oldest boilers of any institution surveyed. Vanderbilt has the least reserve capacity of any plant surveyed. In both of these respects Vanderbilt is operating well beyond the bounds of engineering standards and good practice. Further, Vanderbilt is one of only two plants with less than 12% firm reserve capacity without an approved plant for expansion, and many plants with greater reserve are expanding anyway. Vanderbilt is in the minority of plants surveyed by not utilizing some form of cogeneration. If the institutions surveyed are any indication, there is ample evidence to support plant expansion with cogeneration as a prudent and practical course of action. Figure 3, below, summarizes these comparative findings.



Power Plant Capacity and Demand

School	Identification Number	.....Capacity..... Max lb/hr	Firm lb/hr	Peak lb/hr	Gross Square Feed	Medical School	Vet. School	Cogen. MW
Vanderbilt	1	255	155	147	400000	Yes	No	0.00
UNC-CH	2	495	345	310	9200000	Yes	No	10.00
Cornell	3	650	450	380	10000000	No	Yes	20.00
Rochester	4	600	450	270	7300000	Yes	No	0.00
Purdue	5	780	580	475	10000000	No	No	0.75
KSU	6	335	260	190	5600000	No	Yes	3.75
NCSU	7	300	200	175	6200000	No	(Yes)	0.00
Duke	8	310	235	218	5800000	Yes	No	0.00
UVa	9	262	172	162	6000000	Yes	No	0.00



Capacity and Demand After Expansion

School /Year	Capacity Max lb/hr	Capacity Firm lb/hr	Capacity Peak lb/hr	Gross Square Feed	Medical School	Vet. School	Cogen. MW
Vanderbilt/86	255	155	147	400000	Yes	No	0.00
Vanderbilt/88	255	155	147	400000	Yes	No	0.00
U Virginia/86	262	172	162	6000000	Yes	No	0.00
U Virginia/87	352	262	192	6000000	Yes	No	0.00

FIGURE 3

A SURVEY OF MAJOR UNIVERSITY POWER PLANTS

UNIVERSITY STATUS	FIRM RESERVE	COGENERATION	EXPANSION
Vanderbilt University	6% (-14%, 1988)	none	Staff study
University of Virginia construction	6% (27%, 1987)	none	Under
Duke University	7%	none	Staff study
University of North Carolina	Outside study	10%	10 mw
North Carolina State Univ.	12%	none	No plans
Cornell University construction	16%	30 mw	Under
Purdue University engineer	18%	0.75 mw	Select
Kansas State University	27%	3.75 mw	No plans
University of Rochester	40%	Chilled water	No plans

E. - CONCLUSIONS

In evaluating the vast amount of information available, one concern is the delineation of numbers expressed in terms of their rigid, absolute values. Many of the studies submitted by various firms reported numbers as being actual limits. This leaves the reader with the perception that such limits are real and inflexible. All of the data submitted in this document is done so with the best technical assessments available. It is simply not possible to work to close tolerances when dealing with flows and loads of this nature.

It is in the analysis of the data that we begin to feel concern for the position we are now in. This concern is based on the following statements:

1. Our total firm capacity is less than 66% of our total plant capacity and significantly below accepted standards.

2. Of the 155,000 lbs./hr. of so-called "firm capacity," 55,000 lbs./hr. is divided among three 50+ year old boilers in only fair condition and firing a fuel with a 2.5 to 1 cost ratio.

3. The nature of the loads we are adding (in the Medical Center) continues to increase the minimum base load which must be provided. This leaves a larger shortfall to be distributed over a relatively small campus load.

4. If the practice of reduced temperature operation is a serious consideration, there has been no attempt to advise the users of the service of that possibility, for probable good reason. There is no clear strategy for how to prioritize various departments. Present funding mechanisms would hinder any harmonious agreement as to "who goes first." We believe our position in such a case to be hopelessly inadequate to resolve the issues.

5. All future considerations for additional facilities must be viewed in terms of the continued erosion of already narrow margins for safety of supply versus demand for steam. Such decisions must begin to resolve themselves through the practice of installing independent gas-fired units for these projects. The effect of such practice on our operating expense, not just for fuel, but maintenance costs as well, must be factored into such capital decisions. It quickly becomes evident that, unless we take some action to increase our plant capability now, we are simply either deferring the decision, as has been the case up to the point, or our future strategy for fuel flexibility, utilities cost containment and improvement in operational efficiency will be fixed by the lack of adequate capacity.

6. We do have in place a system for providing fuel flexibility in order to protect us from changes in market conditions. The strategy for cost control must include the ability to react to a potentially volatile marketplace.

7. There is still no provision for emergency power in the event of a major electrical failure. Since 1967, there have been over 400 blackouts of varying sizes and duration across the country. A loss of electrical service will shut down the main power plant.

8. It is appropriate to observe that the case one might make for reliability without any addition rests solely on the backs of two 20+ year old coal fired boilers with enviable operating records. It is also practical to expect and plan for an increase in the potential for component failure as their age increases.

9. The decision to continue deferral of plant expansion results in a loss of opportunities which should provide an attractive return-on-investment and appreciable savings potential. It is the specter of these opportunities that allow us to consider more than just the name-plate date. It appears that a qualitative improvement in service, reliability and cost containment could result from the planned expansion of the boiler plant.

IV - THE QUALITATIVE CASE

In the development of a rational approach to the solution of the plant expansion problem, several smaller seemingly unrelated problems have been identified.

Such problems as:

- Emergency power for the power plant
- Why do we distribute at 125 psig? Can we reduce that?
- What about the Flack + Kurtz refuse proposal?
- What about the Peabody steam plant?
- How can we reduce operating cost for fuel?
- How do we provide fuel flexibility?

What has surfaced is the need to relate these questions to a comprehensive plan for steam generation and distribution. The concepts that began to emerge in terms of potential solutions seemed to form a broad-based strategy which could provide most of the needs for Vanderbilt steam requirements for the foreseeable future.

A QUESTION OF ALTERNATIVES

In developing this report it became obvious that the ACC and other future projects would affect more than just the steam plant. The impact to our electric demand cost is estimated at $300,000 to $400,000 per year. We project an increase in our demand limit from 23 megawatts to almost 30 megawatts by January 1989.

We also began to seriously review the Peabody Plant in terms of capital needs, useful life, condition, cost of operations and reliability. In their June 1981 study, Flack + Kurtz looked at the opportunity to connect the Main and Peabody plants, but stopped short on the project due to lack of capacity. The proposed cost of the project at that time was $600,000 for a direct buried line to be carved across 21st Avenue. The problems associated with interrupting traffic caused some concern.

A study was recently commissioned to investigate the costs and alternatives for refuse collection and disposal campus-wide.

All of these additional issues have been reviewed and the results form a creditable potential for liquidating the entire capital costs over time. The initial data suggests that it is a practical consideration to provide additional study in order to firm up these numbers. However, we feel that the opportunity to fund the expansion, regardless of actual payback time in years, makes the entire scope of work more economically viable.

WHAT ARE THE CHANCES?

In evaluating any major capital expenditure, it is necessary to consider the best available counsel concerning the possible options. Where Power Plant capacity is concerned, Vanderbilt has received the benefit of expert counsel from several of Nashville and the country's most respected engineering firms. The advise has been unanimously consistent in support of plant expansion. All of the experts have warned of our vulnerability to insufficient capacity.

Specifically, we have received the counsel of Flack + Kurtz in 1977, 1981 and 1984; Syska and Hennessey in 1973; Power Services Company in 1984 and I.C. Thomasson in 1985. These firms have each conducted evaluations of Vanderbilt's Power Plant and each have concluded that our steam plant capacity is not within accepted design practices, that some of our boilers are too old to rely upon for firm capacity, and that there are not adequate provisions for producing steam in the event of a power failure. If these expert warnings were not sufficient, our own planning department has similarly reported, in 1975 and 1978, that the capacity of the Vanderbilt University Power Plant is insufficient to provide reliable, uninterrupted service to the present campus and medical center in the event of an outage of one coal fired boiler.

To place specific measurements on the degree of risk from insufficient capacity is extremely difficult. It should be sufficient to observe that many respected engineers have all reached the same conclusion, that the ***risk is unacceptable by prevailing engineering standards.*** Many major universities have also subscribed to these standards. If one must attempt a measurement of the risk, it should begin with the accepted standards for coal fired boiler availability. For such boilers as a group anything above 90% availability is considered good. Over 95% is considered exceptional. That sill leaves 5 days in 100 when the boiler is not available. Our particular boilers have experienced an average availability of 94% over several recent quarterly periods. Unfortunately, some quarters are as low as 89%. The worst availability is during the quarters with the highest steam loads. Some quarters with high steam demand have experienced as many as 10 days when one boiler was unavailable. Components of all types tend to fail most often when stressed the greatest. That is always during peak loads. Given the 23 year age of our boilers, engineering experience points to an ever increasing probability of critical failure.

Among the many engineering studies of our Power Plant are two assessments of load carrying ability as it effects building conditions. Prior to construction of the new hospital, Flack + Kurtz stated in 1977, that we could expect to maintain all of our buildings at no less than 50 degrees with full service to the Medical Center and one boiler unavailable. There has been no increase in plant capacity since that time. After evaluating the load for the new hospital (including what we now call Ambulatory Care), Campus Planning suggested in 1978 that we may only be able to serve the Medical Center and maintain 35 degrees in the remaining buildings during the outage of one coal fired boiler. Certainly, this is not a viable alternative for operation of the University, but it may be sufficient capacity to protect our buildings from freeze damage.

The total design loads of Vanderbilt University now approach 300,000 pounds per hour. This greatly exceeds our design capacity for steam production. Only the natural diversity of these loads keeps the actual peak demand within our firm capacity. However, addition of Ambulatory Care in 1988 will bring the actual peak demand above firm capacity. If one of our 23 year old, coal fired boilers fails then, during a peak demand period, the only practical method of protecting our facilities will be to institute a series of rotating outages on the steam lines which do not serve the Medical Center. Such outages would resemble the rotating blackouts covered in most public utility contingency plans. The steam mains serving campus could be valved off on a rotating basis until temperature fall to a preselected level in the buildings. Depending upon the length of the outage, and the severity of the weather, building temperature would vary down to 40 or 45 degrees before steam could be restored to raise temperature to 50 or 55 degrees.

While this would allow us to protect Vanderbilt property from freeze damage, it would necessitate curtailing all non-medical services. Any boiler outage while temperatures are below freezing could be expected to require canceling classes, curtailing food services, furloughing workers and sending students home. It would be practically impossible to keep any portion of these services open and still protect all buildings from freezing. The only workable scenario for rotating outages to reduce plant load (demand) is to valve off one line at a time from the central plant location. The chart entitled **Steam Main Configurations** lists the buildings on each main line and the estimated peak load for each main.

Because of the many diverse components of a boiler which could possibly fail, it is necessary to plan for worst case outages up to several weeks. The exact impact of such an outage is impossible to completely assess beforehand due to the many variables; including daily high and low temperatures, length of previous cold weather, presence of wind or precipitation, timing in the campus calendar, day of the week, month of the year, scheduled events and many more factors. The frightening reality is that the unless added capacity is brought on-line by completion of the next major load increase (Ambulatory Care) these decisions could be made necessary immediately upon the occurrence of even a brief, one or two day outage, should that outage occur during subfreezing temperatures. With an average

availability of 94%, our current plant stands an average of 6 chances in 100 of this occurring. In reality our actual risk at any given moment could be much higher.

The nature of the decisions which will be required in the case of a peak period boiler outage will necessitate many rapid decisions with major, sweeping impact on the life of Vanderbilt University. These decisions will, in all likelihood, require policy guidance which this university has never before faced. If Vanderbilt should decide not to undertake plant expansion, the administration should begin immediately to formulate specific policy on who many curtail which services and under what conditions. Given a worst case scenario, it could become necessary to enforce furlough of up to several weeks for academic and support services personnel, lock users out of their normal spaces, consolidate temperature sensitive materials in areas under different management, eliminate food services altogether and contract for massive levels of outside support under emergency conditions.

STEAM MAIN CONFIGURATION

POWER PLANT

Existing firm capacity = 155,000 lbs./hr.

Hospital Line

(80,000 lbs./hr. peak demand)

- Bryan
- Godchaux
- McTyeire
- New Engineering
- Medical Center North
- Vanderbilt Univ. Hospital
- Light Hall

Buttrick Line

(25,000 lbs./hr. peak demand)

- Buttrick
- Garland
- Calhoun
- Furman
- Kirkland
- Benson
- Kissam
- Law School
- OGSM
- Divinity
- Stevenson
- VUL
- Neely

North Line

(10,000 lbs./hr peak demand)

- Rand
- Sarratt
- Cole
- Tolman
- Vanderbilt
- Barnard
- McGill
- Carmichael East
- Carmichael West

South Line

(25,000 lbs./hr. peak demand)

- Branscomb
- Memorial Gym
- University Club
- Olin Hall
- Morgan
- Lewis

New Loads

(30,000 lbs./hr coincident demand)

- Ambulatory Care
- Medical Research

New Loads

(10,000 lbs./hr coincident demand)

- Student Recreation

In order to provide continuous steam service for the hospital and main campus it is necessary that we move forward with a project designed to provide an additional 180,000 lbs./hour boiler using coal as a primary fuel with #2 fuel oil as an alternative fuel source.

It is essential that the largest size boiler that can physically be accommodated by the existing boiler plant structure be selected. This will ensure that all the high pressure high temperature steam that can be produced is available for use by the turbine generator of a cogeneration system. Also, it is more efficient for one boiler to be able to carry the entire plant base load than to divide the load between two boilers.

The design criteria must be established prior to proceeding with the project. By establishing the criteria for high pressure, superheated steam we are able to improve the steam rate of a potential cogeneration plant by 325%. For example; at steam conditions of 165 psig at 373 F, it will take 80 lbs of steam flowing through a turbine to generate one kilowatt of electricity. However, at 750 F and 600 psig, it will only require 24.5 pounds of steam. The increase in electric output, turbine efficiency and cost containment is substantial.

We recommend that the conditions be set to accommodate the most efficient steam rate practical.

A.	Cost of boiler includes construction, auxiliary and coal handling equipment	$3,480,000
B.	Engineering	243,216
C.	Sidestream Demineralizer	90,000
D.	Improvements to Deaerator and Boiler Feed Pump	100,000
		86,784
	TOTAL COST	$4,000,000

MOLE PROJECT

There is sufficient information to suggest that a tunnel can be bored through the rock under 21st Avenue to connect the Peabody steam plant with the main steam plant which will accomplish the following:

1. Allow the retirement of a 60+ year old asset requiring extensive renovation to continue operation.

2. Convert from gas-fired at $5.79/Mlb. to coal at $1.61/Mlb.

3. Allow the release and reallocation of two (2) full-time shift operators.

4. Free up space in the center of the Peabody Campus for use as a Central Stores facility or other needs. The alternate facility for Central Stores has not been located.

5. Provide a walk through tunnel 8' 6" in diameter between both campuses for service access as well as:

   a. Communication
   b. Electrical distribution cable for future expansion or improvements
   c. Local Area Network cable
   d. Future chilled water lines

6. Avoid any disruption of traffic.

COST AVOIDANCE

The avoided costs that would accrue as a result of this project are as follows:

1.	Fuel Economics	$ 229,020
2.	Salaries/Wages	7,273
3.	Parts & Supplies	6,690
4.	Equipment Renovation	10,000
5.	Utilities	6,210
6.	Other	3,264
TOTAL SAVINGS		$ 302,727
TUNNEL & PIPING COST		1,353,750
PROJECT COST		1,353,750

PAYBACK = 4.47 years

There is sufficient information to suggest that a multi-stage steam turbine/generator can be installed at the main steam plant for an estimated cost of $3,750,000.

The cost of a multi-stage high pressure steam turbine which can generate over 5 megawatts includes all electrical switchgear relay, connections and installation:

PROJECT COST $3,750,000

The reduction in electrical costs to Vanderbilt are calculated from the amount of electrical generation which would result form today's steam flow. As load increases due to the addition of new buildings, the savings will increase.

Cogeneration Savings: (Escalated at 6% per year)

Year	Annual Savings	Cumulative Savings
1	$685,506.00	$685,506.00
2	726,636.00	1,412,142.00
3	770,235.00	2,182,377.00
4	816,449.00	2,998,826.00
5	865,436.00	3,864,261.00

PROJECT PAYBACK 4.85 years

From this information we can recommend that if the boiler plant is expanded, the design conditions be set to provide superheat conditions. We further suggest that the concept of cogeneration be reviewed by an engineering firm to corroborate our data. Initial discussions with a local firm support our findings

This project will provide the following advantages:

1. Emergency power for the steam plant.
2. An offset to the demand impact of the Ambulatory Care Center and other new facilities.
3. A reduction in electrical cost of $772,000 (Avg./Yr.)

Flack + Kurtz engineers in their study **"VANDERBILT UNIVERSITY STEAM PLANT & SUBSTATION EXPANSION,"** in 1977 recommended a detailed investigation into the feasibility of refuse incineration. We have conducted a preliminary survey which suggests this project is potentially viable. As the data shows, there are some attractive benefits to be derived from such an installation.

ANALYSIS

1. Vanderbilt is presently generating 10,149,000 pounds of trash per year.

2. Average heat content of this trash is 6,500 btu's/lb./year.

3. The cost to have the trash removed is $185,000/year.

4. The value of steam that could be generated by using this trash as fuel is $150,000/year.

5. Cost of operation for this program would be $119,000/year.

6. Summary of costs versus savings:

Existing		
a. Cost of steam		$ 150,000
b. Trash collections		140,000
c. Landfill costs		45,000
	TOTAL	$ 335,000
Operating		
d. Landfill (10%)		$ 5,000
e. Transport		14,000
f. Operations		100,000
	TOTAL	$ 119,000
Cost Savings Per Year (Unescalated)*		$ 216,000

7. Cost of Project (Includes a one-time equipment purchase) $1,500,000

8. Estimated Payback 6.94 years

9. Gross square feet for the two proposed systems is 2,500 each.

10. Advantages of this proposal are:

    a. The ability to generate $150,000 worth of steam from refuse.

    b. The ability to contain future disposal costs for over 90% of the refuse generated.

    c. The ability to dispose of hazardous waste material on site as opposed to transporting wastes to an off campus site.

Based on the data, two 1,280 lb./hr. steam boilers can be installed and operated on trash with a gas back-up. With one unit located at the Medical Center, a source of 60 psi steam can now be provided to improve the efficiency of a cogeneration machine, the hospital can avoid costs associated with direct purchase of steam and they would have some back-up for critical use in an emergency.

RECOMMENDATION

To perform a detailed study of the feasibility for on-site incineration.

- While significant cost increases are anticipated in the expense for transportation and land landfill use it is difficult to predict these increases at this time.

V - FINANCIAL ANALYSIS

This is a summary of the estimated cost for the projects reviewed in this report.

PROJECT COSTS

1. Boiler Plant Expansion		$ 4,000,000
2. Peabody Interconnection		1,353,750
3. Cogeneration		3,750,000
4. Refuse Incineration		1,500,000
	TOTAL	$10,603,750

COST SAVINGS OPPORTUNITIES

1. Peabody Interconnection		$ 302,727
2. Cogeneration		772,000
3. Refuse Incineration		216,000
	TOTAL	$ 1,290,727

SINKING FUND

The subject fund was established to provide project capital for improvement to Campus Utilities and replacement of assets that had reached the end of their useful life. To generate income for this fund a surcharge of 14% was added to the cost of electricity. As of January 1, 1986, this fund has an accumulated balance of $5,518,511.

The surcharge is presently generating $836,000 annually and as the cost of electricity increases, the income from this surcharge increases. Also, increases in the consumption of electricity either due to higher use or additional facilities causes further increase in the amount of funds flowing into this account.

It is planned to use $3,000,000 of the present value of this account to provide one time funding for the replacement and disposal of PCB containing electrical equipment. The remaining $2,518,511 will continue to draw interest which will partially offset the principle and interest on the original debt. Leaving the remainder of this fund intact allows the retirement of the existing debt as well as providing a source of funds for future needs such as Capital Maintenance, emergency breakdowns and other projects with high return on investment ratios.

The value of the surcharge was accelerated at the rate of 3% compounded annually to reflect the impact of rate increases and increases in consumption due to present and projected additions to the campus. Good arguments could be made for increasing the rates but we consider our projection to be conservative and defensible considering our recent analysis of regional electric generation for the next 10 years.

This fund was originally conceived to provide dollars for precisely the use we are recommending it for now: Plant asset replacement and utility improvements.

FINANCIAL PLAN

The financial data included in this section identifies the costs associated with the Plant Expansion Project and the revenue streams for the debt service retirement.

The amortization schedule for the total project cost amount of $12,088,943 was obtained from a program residing on the HP-3000 called AMORT.UTIL. The source calculations for deriving the bond repayment schedule were obtained from the Accounting Department and modeled on a Plant Operations HP150 terminal using LOTUS 123. This is the same applications program used to generate the original calculations for bond repayment schedules. The projected unit cost increase for the Square Foot rate impact study was obtained by adding sufficient intervals to the existing curve prediction model recently submitted by Plant Operations, to project the rate into July 1988. An amortization schedule was prepared for the cost of only the Boiler expansion ($4,560,239) which included the cost of that portion of the bond expense. This annual payment was divided among the participants of the Square Foot System as well as the Direct Charge users in a ratio equal to those presently existing. The debt retirement cost was added to the projected cost per square foot as an increase in the utilities segment of the square foot charge.

COGENERATION

The calculations used to identify a source of revenue from this project are based on the current amount of steam being produced for campus use plus a conservative

estimate of the added steam demand for the Ambulatory Care Facility. This steam flow will pass through turbine and cause an electric generator to rotate providing electricity to reduce the amount purchased from Nashville Electric Service. The value of this electricity is based on the present unit cost of electricity although the revenue stream is not shown to commence until July 1988.

In order for this source of funding to provide income, the present level or utility funding must be preserved. The advantage to the user is the avoidance of increases which are the actual value of electricity generated from a cogeneration unit. It is necessary to provide a meter on the generator output lines. The electricity generated should be funded from the utilities budget on a unit cost basis. We would in practice become a small utility operating in parallel with NES/TVA providing about 20% of the present campus load. It is predicted that the total average unit cost for the campus will be lower, due to the anticipated reduced demand.* Our analysis of future electric rate schedules indicates a positive and continued increase in the ratio of demand cost to consumptions cost. This project is a practical and proven method of containing costs as well as reducing the impact due to increases in rate structure.

This income stream was accelerated at 6% compounded annually consistent with previous escalation models to project increases in unit costs. It does not include increases in electrical generation resulting from increases in steam use due to new buildings additions.

Another opportunity is the potential for increasing the amount of summer electricity generated by installing a mini-central chilled water plant using steam absorption chillers. By making chilled water using steam instead of electricity, we divert costs away from a source of energy costing $15.00/million btu's for a source of energy costing $1.61/million btu's. By installing absorption chilling, we increase our on-campus generating capacity during the summer when we need it the most to further avoid electrical demand costs.

* An additional benefit, the 14% surcharge would not be paid on the amount of electricity produced by the cogenerator, thereby reducing the customer's bill for electricity.

PEABODY "MOLE" PROJECT

The income stream resulting from the completion of this project is the result of direct savings for purchase of primary fuels. The cost difference between coal and natural gas and the avoided operations costs of the present satellite steam generating plant on the Peabody campus.

In order for this revenue stream to be realized, it will be necessary to continue the current funding of this plant as a utility cost along with inflationary increases over the life of the debt. The advantage to the user is the elimination of costs associated

with natural gas, for the much lower cost of coal. Costs for natural gas are predicted to fall over the short term in response to reduced oil prices the resulting market pressure as well as changes in control of natural gas pricing. The long term horizon, however, continues to show a favorable trend in the comparative pricing of coal versus natural gas. A further advantage is the avoidance of required capital expenditures needed to renovate the existing satellite boilers and auxiliary equipment if the expansion project is not approved. Any funds spend on this facility will provide only modest gains in efficiency and would require some other funding source. In effect, the Peabody "Mole" is self-liquidating.

REFUSE INCINERATION

The calculations used to identify the value of income to be derived from this source were based on the heat value contained in the refuse as determined by actual sampling and testing as well as the difference in operational costs due to the avoidance of landfill and transportation charges. In order for this income to be realized, it will be necessary to measure the output of the steam generators with flowmeter and include the cost in the charge base in the same manner as the cogeneration project. In identifying the savings, no attempt was made to isolate and identify the value of hazardous waste disposal which is a practical consideration of this project. The advantage to the user is the avoidance of increases in the cost of trash collection and disposal.

As with the other income streams, we escalated the saving at 6% compounded annually.

SUMMARY

This data is sufficient to conclude that the debt service obligations can be liquidated as the report suggests with comfortable margins of safety. If the revenue steams develop as predicted, it is practical to consider the positive impact this would have on future operating costs. There is nothing left to do but approve or reject the project. We recommend that, in consideration of the evidence in support of this proposal, we proceed by selecting a engineering firm to begin the validation of our data and a guaranteed design/build price.

We recommend that the expansion of the steam plant be given a ***top priority*** for funding. We further recommend that:

1. a consultant retained to provide the design and project supervision for the boiler addition.

2. the firm selected be a local firm with proven credentials with similar projects.

3. this firm, assuming there is no conflict with the Medical Center expansion, will also have design responsibility for the "Mole" project.

4. the same engineering firm be charged with the responsibility for verification of project feasibility of the cogeneration project as well as the design responsibility.

5. this firm further develop information on the "Refuse Project" so we can make a decision whether this is a feasible project.

Utilities Paybacks

Dennis C. Watson
Institutional Marketing Manager
CES/Way International, Inc.

Many business officers and facilities managers have said that they were receiving many phone calls and mail from people who were selling some form of shared savings or performance contracting. It was exactly for that reason that the State Association of Executives Council, which is made up of the heads of each state's independent college association, asked CES/Way if we would develop a cost avoidance program specifically for colleges. The program essentially was designed with college personnel so some of the glitches and the bumps in the road that they had experienced would be eliminated. In 1987, we were in the second year of this successful program, and there had been some feedback from physical plant people back to APPA. The thing that was appealing was that this program was designed specifically at the request of the institution to develop positive cash flow.

SCUP released a report in July 1987 that stated that physical plants represent the largest individual problem in terms of facilities on campuses today, because any time you have a problem with the physical plant you have the potential to solve it and thereby generate revenues from your operating budget. It appeared to APPA that there was an opportunity to develop the performance-based facilities program that would begin with a facilities audit rather than an energy audit. Then it would continue by generating resources or turning a portion of your operating budget into a resource in which necessary capital improvements were made, as well as throwing in the positive cash flow aspect. It offered an opportunity to institutions that at the very least could begin going from a debt negative to a debt positive position in capital renewal.

The energy program was extremely positive, particularly here in the northeast. We did back off and begin evaluating the possibilities of a new, broader program. Again, we worked with college people because this was going to be their program. We completed the design of the program, and we did two prototype projects. We did one because of the differences in public sector and private sector. We did a public sector program at Kutztown State University in Pennsylvania, and we did one in the private sector working with both the U.S. Department of Energy and the United Negro College Fund.

For the UNCF school, Johnson C. Smith in North Carolina, there was a method in our madness. Coopers & Lybrand had found

that, as a group, the 117 historically black institutions had the most serious problems. The UNCF represents about forty-five of these institutions. Their concern was that they might actually have trouble getting good people to serve on their board of trustees or just their board if it became known that they had a serious, threatening facilities problem. If you ever have an opportunity to see the listing of the board of directors of UNCF it reads like the Who's Who of the Forbes 500. These people obviously do not want to serve in a position or preside over a situation where they have got college campuses that are literally collapsing in on themselves.

Nothing is going to happen in this capital renewal/deferred maintenance area unless two things happen. First, the policy makers, the governing boards, have to be sympathetic to the problem. Second, and more important, you need money. There is not a person in this room who could not go back to the campus and implement a program like the one at Vanderbilt University if you had the sympathy of your policy makers and if you had the money.

The program I will describe is not an all-purpose one, but there is a need for some alternative funding mechanisms if CRDM backlogs are going to be satisfactorily addressed.

Facilities Audits

If in fact institutions are going to address this problem, then there is a need for some creative funding alternatives. In addition, governing boards must take existing facility needs into account and make resource allocation decisions. A better funding balance must be achieved between operating needs and facilities.

A lot of things are happening out there in the realm of trustees that is causing this to occur. The New York Commission of Independent Colleges and Universities, the largest independent association of all of those in the states, has 116 members. The president of the commission recently had thirty-five of his presidents come into his office with <u>The Decaying American Campus: A Ticking Time Bomb</u> in hand. They had gotten the book from trustees. So the word is getting out. There is also a move afoot to have a formalized seminar made available to trustees in the states where there is a desire and a request for it. There are requests beginning to come forward from trustees wanting to be brought up to speed on this particular problem.

There is a national association that is being formed in Washington as an outgrowth of the old National Association of Energy Service Companies to address this problem. Again, the greatest cause of the problem out there is that facilities audits are not being done. Where they are being done, amazingly, they are not being integrated into the master plan. We have been quite amazed traveling around the country talking to institutions. Some prestigious institutions do not do facility audits; they do not even do master planning. A lot of institutions who were saying, "Why should I spend 5 cents, 8 cents, or 10 cents per square foot for a facilities audit when it's going to do nothing but give me a lot of bad news?" And then there is the prospect of taking the audit to the board of trustees, after you already have been going

to them with all these facilities requests, and basically you do not have the money to address these needs. So the program must begin with a facilities audit and a commitment to integrate it into a master plan.

Financial Master Planning and Packaging

There are professionals who can help you, or you can do this yourself, but you must have a master plan that integrates the findings of the facilities audit.

Nothing is going to happen in terms of making these programs work unless the financing is packaged and all the companies involved have people who are specialists. The president of our company is in fact a CPA; he is not an engineer, and he has a national reputation for putting together the type of financial packages it takes to drive these programs. We are not in the financing business. We do not make any money off the financing packages, but these programs will go nowhere unless there are financial packages out there. They can be a combination of the public sector, grant monies, or rebate programs. We do not care where the money comes from; basically, we are looking at the lowest interest rates that we can find.

There is very little financial risk because of the way these programs are structured. There is no up-front or out-of-pocket cost involved. Everything that is done on the performance side of this program must be paid for with the results. The guarantee involved in the program is that a minimum cost including implementation, engineering, construction supervision, maintenance, etc., must be covered as a covered program cost before any money flows back to the facilities service company. Positive cash flow is designed into the program.

For example, we did the two prototype projects in North Carolina and Pennsylvania. We are now well into the largest program that has ever been done in this area. It is at Louisiana State University, which has a $13 million utility budget. We are saving them $4.3 million a year, of which $1.3 million is positive cash flow to be used for capital renewal and deferred maintenance (or really anything else, but that is what the money has been used for). The community benefits because roughly 70 to 80 percent of the money that is spent in these programs is spent in the community. We hire design firms locally to do the work if they are available, qualified, and willing. All of the contractors are hired from the local economy if they are qualified. The final voice on all these participants belongs to the client.

Single Source Responsibility

The facilities service company is the only person that you have to speak to in this whole process, and you are in the ideal position of dealing with them because you have the checkbook. They do not get paid the incremental portion of their fees on a monthly basis until all the other costs have been paid--until the goals, targets, and parameters that you have agreed upon together have been achieved.

Payment

One of the things that we continually hear is that maintenance budgets are being cut annually. It is not at all unusual for an institution to build new buildings and not put any money in the maintenance budget to cover the maintenance items. In fact, they may come back the next year and cut the maintenance budget. One thing we typically hear from institutions when we talk to them about doing things like cogeneration or DDC facilities management systems is, "Is this going to incur an additional maintenance cost?" Whenever that happens in one of these programs, those costs must be covered as an incremental cost to the program for the life of the program. We do not care who does the maintenance--your people can do it, contractors used in the project can do it. But it is going to be done, and it is going to be paid for.

Monitoring

Perhaps you are familiar with the studies that the federal government has done on the relative success of the U.S. Department of Energy's Institutional Conservation Program. They found that these programs typically fail because of a failure to monitor. The first year all the efficiencies were there, but typically by the end of the fifth year they disappeared entirely. There was no incentive in the programs for anybody to monitor, so it did not happen. Our programs monitor and maintain because, quite simply, the person who has single source responsibility will not get paid if the program fails to work.

The other thing that was built into the program for colleges was a buyout option. If the program is working, you are on top of the maintenance, you are monitoring, you are saving more money than we initially projected (which has happened in every case), and you decide you want all the results to go to bottom line, then you can buy the program out using the same rules that would be used to pay off a mortgage. The procedures are simple. It is performance-based from the word go. It begins with a tiny agreement wherein we come in and in a limited amount of time (usually three to four weeks) we put together a report that determines if, from a technical and a financial point of view, there is a viable program available for your facility. Failing that, failing even half of that, we walk away from the process, with no obligation on either party to the other. If all the pieces are together, we then go into a detailed planning agreement where we actually put the nuts and bolts of the program together. Again, there are off-ramps built into this process so that if it is not coming together we can walk away with no obligation to the college or university.

When we go into the implementation, we do construction supervision, we sign off on everything that is done with you and your people, and then we go into the monitoring, maintenance, followup services, reporting, etc., and we actually make the program work. This is a partnership between the company and the institution. For example, from FY 1988 to FY 1989, Kutztown State

had a problem you would all love to have--they increased their enrollment by 50 percent. And yet with the 50 percent enrollment increase, we only lost one percentage point of energy savings.

Funding Vehicles

There are several funding vehicles being used by institutions of higher learning in attempting to address these problems: general obligation bonds, tax-exempt installment purchases, taxes and municipal leases, vendor financing, ESGO shared savings, and ESGO guaranteed savings. Let's take a look at the pros and cons of each one of these.

General obligation bonds. This is the way you do just about anything on your campus. It has the lowest possible interest rates, there is a long-term repayment schedule, and the institution owns the equipment from day one. It employs the traditional bid/inspect approach. This is basically the traditional financing approach.

There are some disadvantages to using this approach. You have to go through the time-consuming process of hiring engineers, hiring architects, going through the design process, hiring attorneys, and getting the contractors on board. Generally, there is large up-front capital required for the bid/inspect work, engineers, architects, attorney fees, and your in-house resources. You have maximum risk because there are no guarantees. You pay the architects, engineers, and contractors, and then they walk away. Whether or not it works is pretty much your liability. There is no savings guarantee. Obviously, if everybody is paid and they go on down the road to do the next project, they have no economic tie to the project.

When we put the payback program together, there is a definite economic tie because we are not paid on a continuing basis unless the program works. Debt does appear on the balance sheet. It is a flexible program. Funds are designated for specific uses, and there is no reserve fund allowed.

Going back to the LSU example, that is a $20 million program. It started out as an $11 million program with a seven-year life span. LSU was looking at the information we showed them and they decided to put in some capital renewal items like roof insulation, storm windows, some of those building envelope items that have longer pay backs. So they pulled all these into a ten-year program, which is about $19 million. But by tying in those high pay back items, they are getting some capital renewal things done.

You are looking at a fixed interest rate; level payments typically are required into the later financing. If you are in the public sector, typically you require voter approval. Again, there is no ongoing monitoring. You do not bring the added service and engineering expertise to the table as you do in some of the other vehicles.

Tax-exempt installment purchases. This is probably the next lowest rate of interest. Again, you do get a long-term repayment schedule. You own all the equipment from day one. Typically, it

is a traditional bid/inspect approach. It does have some flexibility that the other did not. It does allow reserve funds, and you can have fixed or floating rates. It does provide interim financing. Usually there is a buy-out option that can be built into these programs, and typically voter approval is not necessary.

On the negative side, again you have the time delay. You have to figure in the administrative costs, engineering costs, and attorneys fees, and usually there is large up-front capital required in terms of all of these services. There is a risk for the bank, because it is up to the institution to make the payments, and there is no guarantee of success. There also are no savings guarantees, and no economic ties for the people who do the work. They do the work, they are paid, and then they leave. No monitoring is involved, no added service expertise is brought to the table. It is a nontraditional type of funding, and it requires some pretty heavy attorneys' fees.

Tax-exempt municipal leases. This applies particularly in the public sector. There are, however, some ways that private institutions can use this approach. Smaller institutions can work with the local municipality and set up the 501(c)(3) mode. It does have a fairly low interest rate. The long-term repayment schedule is there, and again you own the equipment up front. This is a fairly typical procurement method in the public sector. It is flexible, there is a buy-out option, it can be set up so that voter approval is not required, and there is no debt on the balance sheet.

On the negative side, again you have the time delay problem, and typically large up-front capital because of that. You again have the risk because there are no guarantees. There is no monitoring, no added service expertise, and, since it is nontraditional, extremely high attorneys' fees. In addition, high interest rates come into play because you have language that says it is a year-to-year deal. If the money is not appropriated in each subsequent year, then the deal is off.

Vendor guaranteed savings. This is a situation where a vendor wants to sell you a black box or a magic potion on the basis that it will pay for itself in X number of years. Typically, guarantees are provided in some way. The vendor does have economic ties because the thing has to work in order to keep you happy. There is ongoing monitoring, because you are not going to be able to tell what savings are occurring if that does not happen. There are fairly low engineering dollars required, because this is typically done by the vendor who wants to sell you the product. The implementation is relatively quick because of this. There usually is no voter approval required, although some states' procurement statutes do require it.

There is a limited risk, but there is risk. These programs typically provide interim financing from the vendors. They do bring added service expertise to the table, and there is a profit motive because many of these programs build in a situation where they can make additional money if they save you money over and above what they have said they would save.

On the down side, we found that a lot of institutions were having problems with this because it is a limited risk approach. These firms often use performance contracting as a marketing vehicle to sell a product. You might end up with a slightly square peg in a slightly round hole. Typically, we find that people who sell control systems--the DDC systems for facilities management and energy management--want to sell you things like color monitors and a lot of hard drives. We have yet to find a color monitor that has ever saved a Btu of energy. We are glad to put color monitors in your programs, but you are going to have to pay for them or the money is going to have to be made available.

These are also very high interest rate programs. And here you do not own any of the equipment until the end of the program. Short-term repayment schedules are characteristic, and there is limited capital available. It is difficult to spread this type of program out into a comprehensive program that will fit other special needs. Usually these companies are going to come to you initially, or they are going to come back to you eventually, and say, "My system would work much better if you would just sign this six-figure service contract." In some cases they may even claim that the system will not work unless you have a service contract. We come in on a lot of situations where we eliminate those service contracts and take them into our program. They are covered by the full maintenance aspect I mentioned earlier.

As far as adding things in the future, this is almost impossible with these kinds of programs. They do not allow for reserve funds. We do find some institutions that have a five-, six-, or seven-year program, and they have a need for additional capital. We make a seven-year or ten-year program so that additional capital becomes a reserve for them to use in whatever manner they wish. We just stretch the payback aspect of the program out to pay that capital back. With these other vendor guaranteed savings programs, there is never any flexibility, there is a much lower return to the institution, and typically there is no buyout option.

Shared savings service agreement. This is a situation where you can have no debt on the balance sheet. This is probably one of the most acceptable and most used programs out there today. It brings to the table a lot of the things that the traditional programs mentioned earlier did not bring. The primary aspect when you have an energy service company or a facility service company is that you have the checkbook. There is one entity that is totally responsible for this project until the day it is paid for, and that entity does not get paid on a month-to-month basis until all the costs are paid for.

There are some negatives. There usually is limited capital available for these programs. Usually they come with a very high interest rate, and ownership does not occur until the end of the project. There is a short-term repayment schedule. It is not traditional financing. It is very difficult to add to the program. No reserve funds are allowed, and typically there is a lower return.

Tax-exempt leases. The primary package that we find financing these programs are guaranteed savings tax-exempt leases, whether we get into a 501(c)(3) or another type of vehicle. There are very low interest rates, long-term repayment schedule, the institution owns the equipment from day one, it is very flexible, and we can change it daily, monthly, or yearly. The buyout option is there. Typically it can be done without voter approval. Debt is off the balance sheet. You have performance guarantees. The service company has definite economic ties to the program and all of the positive features of the other programs.

There are some negatives to this, although very few. You do have a financial commitment on the lease. In other words, your name is on the bottom line. It is not traditional funding; in fact, it is very nontraditional. You rely on the service company, and that means that the whole program is as good as the service company with whom you have the contract. The most reliable companies are those that share with potential clients the firm's audit and financial statements.

One of the objections we hear (although we do not think it is that big an objection) is that the method of choosing the service company is subjective. It really is no more subjective than choosing architects or engineers.

Energy-Savings Programs

Public utilities commissions in individual states are looking at the costs of electrical generation today. They are also looking at the fact that not only is electrical generation very expensive right now, it is getting even more expensive. For example, the state of New York runs anywhere from $2,200 to $2,800 per KW, and that is for conventional, not nuclear power.

The thing that is going to drive energy policy from now on is going to be the Clean Air Act, not going to war with Saddam Hussein or any other event. What we are seeing is the potential for the cost of generation to double or triple in the next three to five years. This means that as a utility looks down the road to their megawatt demand needs five, ten, fifteen, and twenty years from now, there is no way the utility commissions or the public service commissions are going to be able to improve the types of costs of generation for that increased megawatt usage.

There are a lot of different types of rebate programs around the country. Probably the most lucrative ones started in New England--in Maine, Massachusetts, and Connecticut. The utility companies were driven into these programs by the public utility commissions, who said, "Get out there and compensate your major users for cutting their use." This does not really address the problem of increased megawattage needs down the road, and the fact is that the Clean Air Act is going to drive the cost of generation off the charts.

So these programs are going in this direction. The utility commissions are telling the major utilities to go from the supply side generation over to the demand side. If you go out and even are successful in reducing demand, it has to stick for fifteen years, because you cannot come back five or ten years down the road and all of a sudden discover that the demand

reduction you achieved is slipping. So in New York the public service commission is working with the utilities companies to put out a request for proposal to companies who want to, on a performance basis, commit to reduce a certain percentage of that wattage. We will put up a bond that says that we will achieve a reduction of, say, 10 megawatts, and we will maintain that reduction for fifteen years or 1) we don't get paid incrementally, or 2) we forfeit the bond. So you now have a vehicle where you not only know the reduction is going to occur, but also that it is going to stick.

There are three of these programs, two of which are in New York. In one of the New York programs, we will initially have $11 million of their money, something like $1,200 per kilowatt, to give to their clients to do those things that will reduce KW demand. This is designed to work as a single source program; the company that you go to work with is the one you have to stick with. We give you a set amount of time to complete construction--the New York program is going to be four years--and all of the money flows at the end of construction to the client, 100 percent. The company is paid like it always is, we attach fees to each service we perform. These are transparent fees that are covered by the cost of the program.

The CON ED program in New York provides an example of how this works. They were thinking about this even before Saddam Hussein crossed into Kuwait. After that they doubled their rebates, which run anywhere from $1,000 for high-efficiency fluorescent to a high of $2,700 per KW for high-efficiency motors. They are also into such things as cogeneration, absorption, and thermal storage.

In the CON ED program, we had to have letters of intent from institutions to even go into the program. Those letters of intent allowed us to submit on the basis of their campuses. Since we are members of APPA and SCUP, we are institutionally oriented. In a project summary for an institution we will call University A, the retrofit costs that we submitted were about $16 million. The rebate that will flow to them from CON ED is $14 million. This is going to give a construction cost deficit to the university of roughly $282,000. The total annual savings in this particular case is [illegible],000. There is a simple payback of roughly 9.7 months, and the annual debt service if they choose to go out and amortize that $282,000 in ten years, 8 percent would be $42,000.

University B is in much better shape. They are looking at a retrofit cost for the items that we submitted on about $1.5 million. The rebate is going to cover almost $1.4 million. That means they are going to have to come up with $37,000, and that works out to a 1.7-month payback.

These programs do something else for you when you start talking about facilities renewal and energy management. You can use them to leverage not only a comprehensive energy cost avoidance program, but a facilities capital renewal/deferred maintenance program. Going back to University B, we looked at additional capacity ten-year annual debt service of $5,642 in additional savings. The savings was $320,000. We figure that in structuring a performance-based program that the potential debt

service that we can work with is 65 percent savings, which in this case would be $208,000. This means that we could potentially go out and finance an additional $1.4 million in improvements with no additional savings and take the construction costs out of that to $37,000. With no additional savings with that particular institution, we could do $1.3 million of capital renewal/deferred maintenance items just as the program stands without any additional savings.

When we were working at this institution, by going around the campus we determined that there were a lot of other things that could be done, not only in the maintenance area but in the fossil fuel side. We just put into the formula five-year payback items. Actually, these are in excess of five-year payback items, that would give us a total annual savings of $547,000. This would in turn give us, in a performance-based program, a potential annual debt service of $355,000. This means that we could potentially finance roughly an additional $2 million in improvements.

This is one of the reasons why any funding that we can find out there--grants, overcharge money--is critical, because it leverages your ability to do a program that will allow you to address across the board a comprehensive capital renewal program. I would suggest that you go to your utility company and ask them just where they stand in terms of implementing these programs.

We hear a lot of stories, particularly here in the East, about nuclear plants that are sitting on the shelf somewhere not working at all. One of the problems we had in New York was that the utility companies were very bad about bringing their customers up to speed on what was happening. In fact, the utility company's local representatives did not even know about this program. So you really need to hold your utility company's feet to the fire on this, because they are hearing this from Washington. They are hearing it from their public utility commissions. There are only two kinds of utility companies out there: those who are in these programs and those who will be in these programs.

You need to get plugged into the process so you can begin planning, because in the area of planning, financing, and building capital renewal and deferred maintenance programs, there is tremendous leverage in these programs. You are looking at anywhere from $1,000 to $3,000 per kilowatt.

Something else you need to be careful of is that all utility companies typically have rebate programs out there. They are the type of rebate programs where you can participate in them without anyone's help. They are the programs that pay you $50 to $75 for high-efficiency ballasts, fluorescent tubes, and similar measures. We found one institution in CON ED who had all these $65 and $70 rebates, and we could have gotten $1,000 a KW. So, this is another reason why you need to talk to your utility companies. Be sure that they are going to get you into a rebate program that gets you the most for your money.

Building New versus Renewal or Renovation

William D. Middleton
Assistant Vice President, Facilities Management
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When contemplating building new versus renovating, the first concept to consider is the life of our buildings versus the life of our programs. We plan our buildings to be at least fifty-year facilities. In actuality, the life of our buildings is indefinite. Using the University of Virginia as an example, we have some buildings that are now at 170 years and we are still counting.

In contrast to the long life of our buildings themselves, is their functional life span, which is far shorter than the life span of the building. Our programs change and instructional methodology changes over time. Particularly in research, technological change is accelerating at an ever-increasing rate. Consequently, the typical campus building goes through a series of cycles within its long life cycle. Typically we have periodic major renovations to adapt a building to new or changed functions. Frequently, in a longer cycle we get into what I call the "gut and rebuild" kind of project, where we basically tear the building down to the original walls and the roof and do the whole interior of the building over again.

What are some of the facilities issues that we face as these periodic cycles occur? Almost always we have some degree of difficulty in bringing the building into compliance with current codes and standards. These change regularly over time, and we typically do not bring our buildings up to date until we are faced with a major renovation cycle. In addition, we will almost always find that our heating, ventilating, air conditioning, electrical, or plumbing systems are obsolete or inadequate, or that they simply do not provide those environmental control services at the level we now expect of a modern building. And we usually have some level of deferred maintenance to deal with by the time we come up against one of these major renovations.

Buildings typically have architectural and structural limitations when a new or different use is being contemplated. The room sizes might not be correct, or the configuration of the building might not be efficient for the new or changed purpose. Ceiling heights can be a problem, and floor loadings for which the building was originally designed may be inadequate for new uses that are being considered.

There are some intangibles that we often run up against. Typically with older buildings there are issues of historic

status. I am appalled sometimes to realize that we are now designating buildings as "historic structures" that are not even as old as I am. But on a university campus, there is a lot of tradition associated with buildings. So when good economic sense says to tear it down and replace it, tradition might get in the way. In higher education there is always pressure for more space. Buildings that ought to be torn down are kept standing because somebody needs more space.

There obviously are some cost issues associated with renovation. The wider the gap between the original building conditions and the new building use, the higher the potential cost. In extreme cases, the cost of demolishing portions of the existing building and renovating can approach the cost of new construction. But the facilities condition index that has been described during this Institute could be a useful evaluation tool when you are considering renovating an old building for some new use. A good percentage of its replacement cost is required to bring it into compliance with codes and standards to meet all the needs of its new use.

Harvey Kaiser takes a similar approach in his Facilities Audit Workbook: A Self-Evaluation Process for Higher Education. In this procedure you perform a building audit and arrive at a percentage figure that roughly approximates the percentage of the replacement costs required to modernize and adapt the building into good condition. For example, we have performed these audits on a number of our older buildings at the University of Virginia, and the campus leader is a building called Alumni Hall, which originally served as a hospital in the Civil War. It is now an academic building and its rating is 72 percent. That means that we are going to have to spend roughly 72 percent of the replacement value of that building to make a modern, fully functional academic building out of it. I would like to be able to make a decision at this point to say "This one's not worth it; let's get rid of it and replace it." Unfortunately, we run into the historic building problem and we will probably spend at least 72 percent of the replacement value making a new building out of it.

The result of all this is typically a renovated facility that turns out to represent rather poor quality space compared to what we could achieve with new construction. There are more examples of this situation. We have a structure on our campus called the Cobb Chemical Building that was built in the World War I era and originally used as an undergraduate chemistry building. Somebody made a decision to convert it to high-tech medical research facility some years back. That was one bad decision. The second bad decision was to not do any overall upgrades to the building, but rather do it ad hoc as each laboratory moved into the building.

Shortly after I came to the University of Virginia, I became acquainted with one of the medical researchers who occupied a laboratory in this building. I found out by talking with him that the only way the researchers could operate in that building was to band together informally to figure out who was on which electrical or other utility circuit, and then work out a schedule. He would agree to run his equipment from 10:00 to

10:30, and then someone else would run theirs from 10:30 to 11:00. That was the only way they could perform research in that building without blowing out all the circuit breakers and otherwise disrupting operations.

Another example is Clark Hall, a beautiful law school building converted to an environmental sciences building with laboratories. This is a 1930s-era building with the utility system you could expect in a 1930s academic building housing classrooms and offices. It took a lot of money to create laboratories in that building, and they are poor-quality laboratories.

I would like to think we eventually learned our lesson. The most recent example of this has been our hospital project. We are just completing the final phases of construction of a replacement for our teaching hospital. One of the by-products of this $215 million project is that we have a leftover old hospital, which we call the "multistory hospital." At the same time that we have this leftover hospital, we have an enormous shortage of medical research space. So the tentative decision was, "We've got a leftover hospital and we've got a shortage of research space. It's obvious: convert the old hospital to laboratories."

Once we looked at that possibility, we realized what a poor idea it was. First, the configuration of a typical hospital building with wards is very poor and inefficient for use as laboratory space. We had a problem with the floor-to-ceiling height; we simply could not get all the necessary equipment in, and we found that the building had floor loading limitations. It was designed for lower floor loadings that were satisfactory for hospital use, but it required structural changes in order to accommodate the heavier loads associated with research. Finally, the utilities in the building were hopelessly inadequate for a research facility.

Had we proceeded with the original project, it would have been an extremely high-cost renovation, probably somewhere around 80 percent of the cost of new construction. We would have wound up with a research building with inefficient use of the space and the net research space/gross building space ratio would have been very poor. Finally, the thing that really turned the tide was that everyone realized we would have substandard laboratory space. We abandoned the idea and decided instead to build new laboratory space. We will use the old hospital for less demanding retrofits, such as non-laboratory research space or offices.

A concept that I learned about in the railroad industry is applicable to the reuse of buildings. In the railroad industry, one of the major physical plant items is the steel rails that the trains run on. The typical procedure that railroads use in maintenance is what they call "cascading" rails. They buy new rail from the mill and put it in mainline tracks where the traffic and the wear is heavy. When that rail reaches a certain wear point, it is pulled out and replaced, and then reused in secondary lines where there is less traffic and therefore less demand on it. Finally, when it reaches another wear point, it is pulled up and used on side tracks in freight yards. So, by cascading, one piece of steel rail might serve

three or four different uses, each one less demanding than the one before.

I like the idea of applying this cascade theory to our reuse of buildings: work them through successive, different, but typically less-demanding assignments, so that we can get the maximum long-term utilization of our buildings at the lowest possible cost. That is not necessarily an easy thing to do, since space assignment or reassignment at a university campus is not typically an orderly planning process, but rather a highly political process. But by finding a way to bring orderly planning to the process, perhaps we can do a better job of reusing and adapting our old buildings.

Case Study: State of Tennessee System

Brenda N. Albright
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Tennessee completes facilities audits and has a system for funding deferred maintenance. There are many parallels with Vanderbilt and Purdue, and some differences. First, Tennessee's system applies to all public institutions, including two-year colleges and universities with enrollments of less than 1,000 to over 30,000. One measure of size is number of buildings to walk through. We have campuses with six buildings, and some campuses with 100 and 200 buildings. All of these campuses are tied into the deferred maintenance funding and audit programs. We also include agricultural campuses and medical facilities, with the exception of hospitals.

We started our system in 1976, when legislators and members of the Governor's staff suggested that if higher education would develop a comprehensive audit system, they would be supportive of funding for deferred maintenance. So in 1976 the task of setting up an audit system for all the public facilities was begun. We used the best tools available -- leadership and expertise at the campus level, with the best engineer from one university, an excellent architect, and a fine business officer. This team designed an audit system for each building in higher education. Our primary focus is to identify facilities that need renovation within a five-year period.

When campuses submit an audit for each facility, they rate the facility on a 100-point scale in regard to condition: foundations, HVAC system, walls, plumbing, electrical, handicapped accessibility, safety, and other systems. For

example, individual campuses rate the roofs by first giving background and descriptive information on whether or not the roof is flat or pitched, information on insulation, roofing materials, etc. Then the roof itself is rated on a scale of 1 to 5, satisfactory at one end of the scale, and demolished, or unsatisfactory at the other.

The roof component of the facilities rating, for example, carries a certain value for the whole building rating. That same system applies to each building component, whether it be ceilings or doors, the foundation, or HVAC system. Each campus rates its own systems.

The campuses submit this information to the state offices and we begin an evaluation process. We send a team from the state offices to visit each campus. The team is composed of a member of the Higher Education Commission office, the state architect's office, and from the state budget office. The involvement of these offices is important in selling the program. Then we involve campus personnel, and walk through each campus and each building to verify the campus rating. Why? One reason is to obtain consistent and comparable data among campuses, because we plan to key this rating into our planning process for facilities and also into the funding process.

The second reason for our visit to the campuses is to communicate to campus leadership the importance of capital renewal. As a part of the visit we always schedule a meeting with each campus CEO. Our team sits down with the Director of Physical Plant, Vice President for Business and Finance, and the President to review the status of the condition of the facilities. Some of the presidents even go around with us and walk through the buildings. This past summer, the Chancellor of the Center for Health Sciences spent a whole day walking through the facilities, even up on the roof. The Chancellor was showing his commitment.

Another important goal of our visit is to raise the awareness of state leadership.

Our very first audit visits were in 1976. We have completed three more cycles in 1980, 1984, and 1990. As we look across the state, we find several differences among campuses. First, the maintenance needs are very different from campus to campus. In part, because some campuses are new. Several two-year colleges have facilities that are fifteen years old and their needs are very different than other campuses. We learned, however, that some campuses, with the same relative age of physical plants were better maintained than others, reflecting decisions of campus leadership.

During our first visits, we found that at some campuses personnel were reluctant to show us the problems. The physical plant personnel felt responsibility for problems. After we tied funding to the results of our audits, the campus personnel went in the other direction, they identified every problem.

Throughout this capital maintenance program, we found that by performing the study, higher education gained credibility. In appearances before the legislative committees to discuss the overall funding program, there is always a legislator who says, "This capital maintenance program is the best program we've ever funded. We want to apply this program to other state departments." And, in fact, the higher education system has been modified and is now used to audit facilities in other state departments.

A statewide computerized data base is maintained and identified by building, by campus, by type of facility areas that need renovation, whether they be roofs or HVAC systems. The computerized system ties to the funding system. Each campus, each state is different in terms of what funding system works. We found that the funding system that works best in Tennessee is tied to

individual projects. A separate fund for capital renewal has been established and currently funded at a level of about $10 million annually. Although funding can fluctuate from year to year, the program has been in the state's budget since 1977-78. Tennessee has had fourteen consecutive years of funding for capital renewal.

The kinds of projects that are funded are repair and renewal projects, not routine maintenance projects or very large renovation projects, such as a $20 million renovation project.

The program is viewed as successful by the campuses and state leadership. One observation is that most of the effort for building support was within higher education. The internal audit program was easy to sell. It was easy to sell to the Governor and the legislature. The tough audience was higher education, the tough chore was getting consensus to move in this direction. What made a difference, again, was leadership. Some presidents were extremely supportive of this program, and they helped sell it. Leaders at the state level who are committed to facilities also helped to sell this program. Now it is very well established.

The 1990's is an excellent time to begin a program to address deferred maintenance, even though funding for many institutions is at a depressed level. When Tennessee began this program in 1977, we were in a recession. There have been years with few funds available for faculty salary increases, and yet there has always been funding for campus maintenance. Now is a good time for starting such programs because of public awareness.

There are certain accountability factors that affect the program in Tennessee which may be applicable to other institutions. When Tennessee came forth with its program, several legislators were concerned about whether or not institutions were maintaining their facilities well. Campuses are now required

to budget what the statewide formula generates for maintenance and operation of physical plant. In general, there are limited controls over the institutional budget with the exception of maintenance and operations. A statewide formula generates expenditures for campuses, and campuses must spend at least 100 percent of what is recommended. These expenditures are presented to the legislative committees. A second accountability area is strict guidelines for expenditure projects for which capital maintenance can fund. These guidelines are important given internal pressures on campuses. Sometimes projects are submitted in the beautification category. One campus submitted a project for covered walkways. The guidelines target funds for repairs. For the first time, this year a $1 million roof is on the list.

Case Study: Purdue University

Frederick R. Ford
Executive Vice President and Treasurer
Purdue University

I changed the title of this briefing to Successful Strategies in Maintaining Facilities--and that's a capital "S." I will discuss an example of a repair and renovation planning model which includes both the needs assessment side and the funding side of the process.

We have been working at Purdue on this process for approximately the last fifteen years. We have cast it in the context on the needs side as a ten-year master plan for repair and rehabilitation. On the other side we have developed a formula funding model which has been accepted by our state for appropriating funds for this purpose. The master plan on the one hand identifies the needs; the funding model on the other hand generates the money to apply toward those needs. So they go hand in glove, they integrate with each other, and they actually validate each other because, as it turns out, they do come out very close.

Particularly for this discussion, both the master planning side and the funding side are equally applicable, to state-funded

universities or privates, and whether large or small. We are talking about processes that I think can be applied in all instances.

Prior to 1975, we operated, like a lot of other people did, on a "squeaky wheel" philosophy. Those things that people were yelling and screaming about most got taken care of and, when the money ran out, that was it. We had no notion as to what our overall problem really was. We decided the first thing we needed to do was take inventory to find out what our needs for repair and rehabilitation were--and the estimated cost of these needs.

We took an approach very similar to Vanderbilt's in that we classified our problems in terms of things that had to have attention immediately, within one year, within five years, and within ten years. We established cost estimates for those problems and summed them. To accomplish this, we had our physical plant engineers, crafts foremen, and project cost estimators form a team to do building inspections.

When we completed those inspections (and at that time we were still recording data manually), we summed the data, and for the first time, we had an idea of the magnitude of the problem we were facing. It was over $100 million. For the first time we had an inventory of what we needed to do now, what we were going to be faced with in the next year, the next five years, and the next ten.

It was obvious to me and to everyone else when we looked at the magnitude of the total problem that we were going to have to take a different approach from a funding standpoint. Our

approach with the State of Indiana in the past simply was not sufficient.

We had at that time five state-supported universities, each with its own board of trustees, each interacting independently with the Indiana legislature, the House Ways and Means Committee, and the Senate Finance Committee. We would hand them a long laundry list of maintenance projects for each institution, and then each institution would lobby support for its projects. The result was that there was a lot of pork barreling, and there was competition between repair and renovation projects and new construction. As a result, the funding we got was minimal.

After studying and thinking about various alternative approaches, we got the five universities together with staff from the Higher Education Commission and the Budget Agency. Based on research at Purdue, we developed a formula that we partially borrowed from Michigan. We modified it to come up with a formula that everyone could accept. At first, the legislature simply used the formula to divide the existing pie. That is, the recurring appropriation that they had been making for repair and renovation.

It took two biennia for us to convince the legislature of the fact that we had this huge investment in facilities, and what we were talking about was preserving that investment against deterioration. Once they understood that, they fully funded the formula. And it has become essentially an automatic appropriation, like the operating base. At least in good years, we do not argue much about the base appropriation, only about how

much more we are going to get for various high priority purposes. That is the way the repair and renovation appropriation is now. The basic funding is on a recurring basis, and we don't have to argue about it very much.

From an institutional standpoint, you would be surprised how much you can get done when you have a steady stream of money coming through the pipeline. Also, it was twice as much as we had previously received. We were able quickly to catch up on roof replacements and the like, and we are to the point where we do not have a big backlog of basic maintenance problems. Now we can focus on things like renovation, modernization, and improvements that go beyond just basic repairs.

To go back to the needs side again, let's look at the master plan. Over time, we have found that it is helpful to have subplans in allocating money. For example, we started a classroom renovation subplan. We have 265 classrooms at Purdue and I had a small committee--which included some faculty, along with people responsible for the management of space and classroom scheduling--do a thorough inspection of all of the classrooms and rank them in reverse order--worst to best.

We started setting aside each year an amount of money (in the current program the total is around $1/2 million) to upgrade and renovate the classrooms: redo the lighting, upgrade the audio visual systems, provide or improve air conditioning, and so on. Likewise, we did the same thing with teaching labs, research labs, life safety, window replacements, and restroom renovations. For example, in our current program, we've got about $2 million

per year allocated to research labs--upgrading and bringing them up to modern standards.

Our current program of inspection is on a two-year basis. Every two years, we send a team of people through every building to update the inspection that was previously done. You never catch everything when you go through once, and some things will have changed.

Particularly in this subplan approach to classrooms, and teaching and research labs, we can get a lot of faculty input. When we go into an area, we make sure that we are getting the faculty and the department heads to set the priorities and give us guidelines. Conversely, we never ask them what they think about a needed roof repair. We do the analysis of the conditions of roofs and make decisions about roof projects in physical plant because this is not something for which most faculty have a good basis to make a judgment.

Like many other universities, we have a number of old buildings. For a lot of them, we know that over a period of time we are going to completely renovate them. Therefore, we develop a master plan for each of these old buildings. As a case in point, we have an old chemistry building, and we have a master plan that details how we are going to spend some $10 million over ten or twelve years to complete the renovation. The chemistry faculty and department head provided most of the guidance; they set the priorities. We provided the architectural aspects of it. We did not just let them do anything they wanted but, within boundaries, we let them determine the direction and priorities of the

renovations that needed to be done, and have gotten a tremendous payoff from this approach.

We update our repair and rehabilitation program on a biennial basis and take it to our board of trustees for review and approval. We have a physical facilities committee of the board composed of three members of our ten member board of trustees. The committee meets four or five times a year. The vice president for physical facilities, the director of facilities planning, and the director of utilities are usually in attendance. We keep them up to date on the overall programs, because we want their support and their commitment to what we are doing.

Another benefit from having a master plan is that it gives you a long laundry list of projects and priorities and that makes it easier to apply multiple sources of funds. We have taken the state appropriation and supplemented it with funds from other sources, such as year-end balances. We also have gift funds that can be used for this purpose. In addition, we have some small endowments that, from time to time, are used to fund high-priority renovation projects. Having a master plan in place makes it much easier to manage funding from multiple sources.

Sometimes we have a project for which we can use a matching fund approach. We approach the dean and ask him to put up half of the money, and we provide the other half. The dean is anxious to get the project moved up on the priority list, and I am anxious to get more work done. We both get some benefits from this approach.

There are also projects that nobody wants to support. For example, we never find donors who are excited about providing a gift for a new roof or for tuck pointing. It is necessary to have some reserves or money buried in the swamp that you can apply to these projects.

Finally, I want to close by recognizing the importance of the interrelationship between the chief business officer and the physical plant officer. The physical plant officer can identify the needs and provide all of the technical expertise concerning repair and renovation needs, and the chief business officer can marry those needs with the various sources of funds.

I must say that when I first started this program, there was a lot of grumbling from the staff. They thought it was another one of those projects that was going to be of academic interest but nothing would really happen. Once the inventory was done and we started funding some of what they thought of as "their" projects, all of a sudden it turned out to be a much better process than they thought it was going to be. We have very enthusiastic reports now.

As a matter of fact, we have taken this same model to our local community. Our United Way organization has various agencies housed in old buildings that have maintenance problems. The United Way started a capital funds foundation to attack the maintenance problems and then discovered they did not have a way to identify the problems or prioritize the funding of them. When my staff and I explained the system that we used at the university, they adopted it. Technical staff from local industry

and Purdue contribute a couple of Saturday mornings and they complete the building inspections. This information then becomes the basis for allotting funds from the foundation.

In addition, before the last election, the governor of Indiana was in the early stages of adopting the same master plan approach for all state buildings, including parks, prisons, and office buildings. The State's buildings have the same kind of maintenance problems as we have at the university. However, we had an election and the new governor has not adopted the system.

In closing, I hope that I have given you some new ideas, and reinforced some that were presented by others here today so that when you return home, you can improve the facilities repair and renovation program at your college or university.

Case Study: Vanderbilt University

Jon M. Gullette
Associate Vice Chancellor for Operations
Vanderbilt University

What I will discuss in this case study is the rebuilding of our campus at Vanderbilt University. Vanderbilt is a private institution with an endowment of about $600 million, 9,000 students, 333 acres of land, and 8.5 million square feet of buildings. The plant budget this past year was about $39 million.

The first initiative was to define deferred maintenance. We modified the APPA definition and said, "Deferred maintenance is the labor and materials expended in periodic restoration of facilities that are deteriorating from time cycles of more than one year."

NACUBO, APPA, and Coopers & Lybrand completed a study in 1988 to determine the magnitude of the deferred maintenance problem on college campuses nationwide. That study revealed that approximately $60 billion to $70 billion of outstanding deferred maintenance exists on U.S. college and university campuses.

Facilities Condition Study

At Vanderbilt, we initiated our facilities condition study in 1985. We divided the campus into four zones, three of which were in the study. (The Medical Center elected not to participate.)

Our approach was simple. Early on we introduced a management philosophy of service and productivity within the physical plant department. We determined the nature of our problems and prepared proposals for those most immediate. Using cost-benefit analysis, we presented the problems to the administration and the board of trust. We identified multiple funding sources for the most immediate needs category. We have kept the issue of deferred maintenance in front of the administration, the faculty, and the board of trust. I recently presented a report to the Vanderbilt board of trust concerning the exact nature and magnitude of our deferred maintenance problem, and I do this on an annual basis.

The purpose of the facilities condition study was to identify the various components and elements unique to each building. After analyzing the condition of those components and elements, reporting our findings, and describing the immediate repairs and actions needed, we developed documentation, cost estimates, and a ten-year project budget plan.

For each building examined, we looked at the following

eight categories:

1. Building site.
2. Exterior envelope.
3. Interior envelope.
4. Handicapped accessibility.
5. Fire safety, life safety, and health issues.
6. Heating, ventilating, and air conditioning systems.
7. Plumbing systems.
8. Electrical systems.

Within these categories, we gave each of the components and elements ratings of good, fair, or poor. If an item was rated good, it was found to be acceptable at the time of the inspection; it required no repair, renovation, or modification. If an item was rated fair, it would probably require action in the next ten years, although it may require immediate action to prevent further deterioration to other building components. An item rated poor was not acceptable at the time of inspection and required immediate repair, renovation, or modification.

We completed the condition study in 1986 and identified our deferred maintenance backlog at nearly $169 million. A cost summary by category indicated the following deferred maintenance backlog:

Category	Backlog in $/Millions
Building site	3.9
Exterior envelope	41.0
Interior envelope	47.9
Handicapped accessibility	5.8
Fire and life safety	14.4
HVAC systems	26.3
Plumbing systems	11.4
Electrical systems	18.2

Looking at the cost summary as a whole, the exterior and interior envelope categories required a majority of the deferred maintenance funding.

Here is another cost summary by ten-year budget cycle, for the same eight categories. The immediate funding need for 1986 was at $48.4 million; the one- to five-year needs were $97.7 million; and the six- to ten-year needs were $23.2 million. Overall, the first, second, and third years make up a majority of the funding requirements. In 1986, the deferred maintenance backlog expressed in terms of cost per square foot stood at $41.

In 1987, I presented another update to the board of trust concerning our deferred maintenance backlog. At that time, one year into the program, we had reduced the deferred maintenance backlog to $153 million. Again, in terms of cost per square foot, the backlog was at $37. In the 1989 update to the board of trust, our backlog was identified at $117 million, or $29 per square foot.

Last November I presented the 1990 deferred maintenance backlog report to the board of trust. For the first time we were

under $100 million; $95.7 million, to be exact, or $23 per square foot. The deferred maintenance cost summary by category for 1990 was as follows:

Category	Backlog in $/Millions
Building site	2.4
Exterior envelope	24.9
Interior envelope	27.5
Handicapped accessibility	2.3
Fire and life safety	8.4
HVAC systems	13.0
Plumbing systems	6.9
Electrical systems	10.0

As before, the majority of the funding requirements exist with the exterior and interior envelopes of the buildings. In the 1990 deferred maintenance cost summary by ten-year budget cycle, our immediate needs category had been reduced to $29.4 million, one- to five-year needs are at $64.8 million, and six- to ten-year needs have virtually disappeared and now stand at $1.4 million. The immediate, first, second, and third years require in excess of 90 percent of the funding.

Applying Depreciation

I mentioned earlier that we identified multiple funding sources for many deferred maintenance projects. The first depreciation account I would like to describe is called the building component replacement reserve. This reserve is funded by a tax on each square foot of academic and administrative assigned space. This depreciation tax generates approximately $1 million per year, and is used to repair or replace building components. The second account is the utility depreciation reserve, which is a 14 percent tax added to the university's electrical bills. Generating approximately $1.5 million per year, this tax is used to repair or replace utility-related components.

We also have asset depreciation reserves. Our power and chilled water plants are depreciated on a straight-line basis. Over the next twenty years, we will put away approximately $8.5 million for repair or replacement of those assets. All small plant equipment--lawn mowers, trucks, and mobile equipment--are depreciated on a monthly basis. We usually maintain $200,000 in that reserve.

Most of the funding for the rebuilding of our campus came from a bond issue. We borrowed $150 million (at cap) to finance most of our renovation and deferred maintenance projects. Project funding was based on a need and cost-benefit analysis. We also obtained energy grants to assist our energy conservation program. During the first two years of the program, we received approximately $1 million in matching grants.

Facilities condition reviews at Vanderbilt will continue on a seven-year inspection cycle. This means we will reinspect approximately ten to twelve buildings per year to update the data base.

The Bottom Line

Here are some of the results, or what we like to call the bottom line. During the first year of the preventive maintenance program, we overhauled many of our centrifugal chillers on campus at a cost of $759,000, instituted a seven-year paint cycle program, and replaced approximately $580,000 of roofing systems. Making major upgrades to the housing area, we completely gutted and renovated six of our dormitories; two are under construction and two more are scheduled for next year. The mole tunnel project was completed, and three boilers and 11 megawatts of cogeneration were added at the power plant.

Other key campus renovations include Payne Hall, Rand Hall, the university bookstore, Kirkland Hall, East Hall, Confederate Hall, West Hall, Vanderbilt Hall, and Barnard Hall. We also installed a new 2,400-volt electrical system on the Peabody Campus and removed all PCB transformers from our network. Additionally, we installed a 1,300-ton central chilled water plant at the Peabody Campus, and presently have under construction another 3,000 tons of central chilling.

Case Study: Denison University

J. Leslie Hicks Jr.
Vice President for Finance and Management
Denison University

I. Background

This beautifully landscaped campus is located atop a hill with a magnificent view of the surrounding valley. Denison is a delightful bit of New England tucked into the rolling hills of central Ohio. A striking array of well maintained Colonial Georgian buildings for both academic and residential activities is the direct result of a well developed 1923 Master Plan. The campus is located twenty-five miles east of Columbus, Ohio, a major metropolitan area of over 1,000,000.

The Physical Plant is as equally important as our endowment. Sixty-two percent of students surveyed in 1987 by the Carnegie Foundation for the Advancement of Teaching indicated that appearance of the buildings and grounds was the most influential factor during a campus visit as to deciding to enroll.

Characteristics of the Physical Plant at Denison -

Plant Square Footage - 1,223,319
Acreage - 1,250 Acres
Average Age Of Buildings - 47 Years
Number of Major Buildings - 54 (About Equally Divided Between Educational and Auxiliary Buildings)
Average Size Of Buildings - 22,654 Square Feet

Remaining Building Life Cycle - 80 Years

1989-1990 Replacement Value Of Buildings And

Improvements - $108,000,000

Equipment - 27,000,000

Planned Annual Spending Rate - $2,500,000 Including $720,000 For Equipment or 1.88% of Plant Facility and Equipment Replacement Value

Maintenance Cost Per Non-Air Conditioned Square Foot - $2.81 Per Year

II. Renewal Activities

We use an annual depreciation rate of 1.88% of facility and equipment holdings at replacement value derived from national norms ranging from 1.5 to 3.0% of replacement value and varies as to sophistication of the educational plant.

III. Facilities Planning

It was Bobby Burns, the poet, who said that the best laid plans of mice and men often go astray and so it is with most master planning for facilities and of facilities on the college and university campus. There are some examples, however, where the plans have been followed to a large degree.

In 1913, Edward Andrew Deeds assumed the leadership in preparing a comprehensive program for the future development of the college. His farsighted scheme including buying up lands (farms) which enlarged the campus to approximately 1,250 acres. Most of this acreage was in the northern section of the campus encompassing both athletic fields and buildings.

A. Evolvement of Master Plans

In the early 1920's at Denison, a master plan was developed from a facilities development and landscape standpoint. In fact this master plan appeared in the October 1923 issue of The Architectural Record. The plan was developed by a New York City architect (Arnold W. Brunner) and a landscape architect by the name of Fred L. Olmstead. This plan has been followed over the past circa 70 years in the development of the Denison campus. The Georgian Colonial style of architecture prevailed in this plan. Olmstead, the landscape architect, had to wrestle with the hilly terrain of the Denison campus. The Granville, Ohio area in which Denison is situated exhibits the last faint effects of the glacier period before one encounters the flat area to the west and approaching Columbus, Ohio.

The master plan mentioned above was developed with the idea that Denison would remain a small college. Ample space was provided in both of the residence hall quadrangles and the academic quadrangle to enhance the building of facilities that would accommodate an enrollment of between 1,000 and 2,000 students. The plan was embellished by the architectural firm of Gehron & Seltzer of New York City in 1955.

A space study completed by Taylor, Lieberfeld, & Heldman of New York City in 1972 further updated the original Master Plan of 1923. In 1988, our most recent Master Plan was completed by MacLachlan, Cornelius & Filoni of Pittsburgh, PA. It included the addition of a science facility; a sports activities center for intramurals, recreation, and indoor track; and a new theater facility.

B. Merger of Shepardson College Into Denison University

In the early part of the century, Denison was involved in a merger. Shepardson College, a women's college, was merged into Denison in 1927. The Shepardson campus was contiguous with Denison campus; however, it was situated on flat land south of the main Denison campus. Therefore, we refer to the former Shepardson facilities as being on the lower campus or down hill.

The level of maintenance on the lower campus was not as good as that of the upper campus. Since 1927 various attempts have been made to upgrade the lower campus facilities - one being the seeking of funds through the Public Works Administration that existed under the Federal reform and recovery programs of the 1930's. No assistance was received from that effort and consequently a Trustee by the name of Edmund Burke provided in his Will for construction of some new facilities on the lower campus. His Will provided for $1,250,000 at a time in the 1940's when a dollar was worth considerably more than it was in the early 1970's when proceeds of the Will were distributed. We did build a Theatre Arts building in 1956 on the lower campus.

After World War II, the Trustee Buildings and Grounds Committee of Denison moved to do something about the large amount of catchup maintenance that had been accumulated over the years for both the upper campus and the lower campus. Through a study conducted by Cresap, McCormick, and Paget, Inc., a professional Physical Plant Director (LeRoss Morris) was brought to the Denison campus in the early 1950's. He set out to correct many of these conditions and was highly successful in

accomplishing the objectives of the Buildings and Grounds Committee. This gentleman came to Denison with approximately 25 years of college and university Physical Plant management experience. In fact, he was one of the few at that time who had devoted his entire working life to school physical plant management. William Sharp came to us in 1969 and remains with us, the second Physical Plant Director in the history of the University. The formula used to make possible moving out of the catchup maintenance stage was to set aside gifts of more than $1,000 in annual support so they could be dedicated to plant facility renewal.

IV. Growth Of The College In 1950's and 1960's

During the 1950's and the 1960's, Denison moved from a college of about 1,000 to a college with a student enrollment of 2,000. It was in 1964 that the Board of Trustees put a ceiling on the enrollment of 2,000 plus or minus 100.

In turn, this enrollment constraint placed parameters on what buildings would be built. This was particularly true in regard to residence halls.

Development work in conjunction with the Ford Challenge grant money, the borrowing of money through the College Housing Section of HHFA - later to be known as HUD and grants from HEW brought about the building of 14 new buildings on the campus. Nine of these were in the student life area and the remaining 5 were academic facilities.

The lower campus was dedicated primarily to the Fine Arts beginning in the early 1950's. A new Physical Education complex, used largely by men, that evolved over the period from the late 1940's through the early 1950's helped in vacating certain buildings on the lower campus. With the erection of a Physical Plant Department maintenance building, additional space was provided on the lower campus when they

vacated a portion of an academic building. Then, too, the residence hall building program helped vacate still another building on the lower campus which was turned over to the Music Department. The merger of the Women's and Men's Physical Education Departments in the spring of 1972 also lent support to turning still andditional space over to the Fine Arts on the lower campus.

Recently, we completed an expansion of fields for baseball, softball, and a general practice site.

V. Village Zoning

Denison operates under the zoning provisions and regulations of the Village of Granville which were established in 1966 with several upgrades to date. We fall under the University District for a major portion of the Campus. Control is exercised over height of buildings for fire control purposes and traffic flow to and from Campus with regard to buildings that could conceivably prompt traffic congestion.

A small portion of our Campus is in the historical district and the treatment of buildings and materials is much more precise. In addition, it is subject to architectural review.

VI. Current Master Plan

Currently, our master plan for the campus calls for three new buildings--a science facility to house geology/geography, mathematical sciences, and physics/astronomy; a sports activities center for intramural/recreation and varsity track; and a theater/auditorium for drama performances.

VII. Depreciation Provisions

Some 20 years ago, we had about 42 percent of the plant book value in the debt service mode. We have worked on that to reduce it. Currently, we are at zero. We retained these debt service elements in the budget and converted them to depreciation provisions. The concept put in place was to setup a flow that was about at the 2 percent level of the replacement value of the plant.

During the same time, we embarked upon a plan to establish some working capital for facility and equipment renewal from excess enrollments over those budgeted. This enabled the establishment of a "subsidiary endowment" in plant funds out of that working capital. Some of the conservative trustees have requested this approach; thus, we are to use only the income off of the corpus for plant renewal. This concept to fund renewal has been in place for only two years.

Where this approach does not work, is for things of a truly majar nature like the master heating boiler replacement. We are facing that in the next five years, and we are talking about a $4 million program. We have not arrived at the point where we have established some sort of revolving fund where we can take a major project and do it internally. We may end up borrowing to do something like the boiler through the Ohio Higher Education Facilities Act.

VIII. Physical Plant Management Scope

The overall mission of the Physical Plant operation is to provide the services to plan, construct, maintain, and operate an environment for the academic program and student life, including all the varius support departments necessary for these two central university functions.

The primary mission is service. A commitment of men and materials to respond to requests for service to the university in an efficient, courteous, prompt, dedicated, fiscal responsible, professional and technically correct manner.

The following are the functions of the Physical Plant to achieve the above mission.

A. Operation of systems - heating, cooling, electrical, ventilation, water supply, refuse disposal, sewage disposal.

B. Services support - graduation, registration, special program setups, homecomings, athletic contests and other similar occasions.

C. Maintenance - buildings, street, utilities systems, grounds and furnishings.

D. Planning - space modifications and renovations
- new construction
- utilities to [illegible]ately service requirements
- traffic flow (vehicle and pedestrian)

E. Construction - major capital improvement by contract
- major repair by contract
- renovations by university forces or contract

F. Fiscal Responsibility - cost containment
- cost distribution
- projection of future costs

IX. Methodology Used for Plant Operation and Maintenance Cost Control

A description follows of some of the methods we have used to stabilize or reduce our costs.

Our major objective in the operation of the Physical Plant at Denison has been to provide an environment for education that is pleasant and safe. This requires that all major systems are constantly monitored to anticipate and correct small problems before they grow into large ones and disrupt the academic process. This is accomplished by a continuous inspection of all major systems by our mechanics and supervisors.

The dominant consideration in all that the Physical Plant Department has done over the past 10 years has been to reduce the cost of energy. Energy costs have entered into all of the decisions that have been made with regard to repairs and replacements. The most energy efficient method has always been chosen in all of our work. This has resulted in cost avoidance that has enabled us to contain overall operational increases in energy, labor, and material. An example of this energy awareness has been the selection and installation of improved

insulation when replacing the roof systems. The selection of water saving showerheads and flushometers used in our routine repairs. Everything we repair or replace we upgrade from an energy perspective.

Denison has stayed abreast of the technology explosion by utilizing such equipment as our computer controlled energy management system, and our computerized boiler controls in our main heating plant. We have also incorporated minicomputers in the control of our air conditioning compressors to enable them to be as energy efficient as possible. We do analysis and accounting of energy costs on a computer and plan to expand our capabilities in this area.

Capital improvements are done on the basis of legal mandates, safety and health, preservation, maintaining program needs, efficiency and systems support, comfort and general accommodations, and appearance and normally in that order.

The University has also stressed employee training to make our people more efficient and effective. There are systematic efforts involving study and testing.

The Physical Plant Department has compiled a long range plan (20 years) through facilitiy audits with estimated costs for the repair and replacement of equipment and buildings for both our residence hall buildings and academic buildings. This totals some $8,500,000 at today's prices.

X. Summary

It takes creative planning (some formal and some informal), a fair amount of luck for things to fall in place, and considerable teamwork. There is no magic formula to plant administration.

The Outlook for the 1990s in Higher Education

Arthur M. Hauptman
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Consultant to the American Council on Education

My sense is that colleges are probably a lot better run today than they ever have been. For whatever reason, the level of sophistication of people is so much greater today than twenty or even ten years ago. Yet one still gets the sense from listening to college officials that they are still dealing out of their back pocket when it comes to financial issues. In this regard, colleges are doing themselves a disservice.

For example, when oil prices go up, most colleges have everything under control through the use of long-term energy contracts. One aspect of an industry like higher education, with its administered pricing structure, is that it is not as susceptible to the comings and goings in the market as industries in which prices are not so much administered. Higher education is able, by virtue of long-term contracts, to moderate the variations of the market. Yet many college presidents will say, "Our costs went up, and we passed them on." I think there is a lot more movement in the other direction--that revenues affects costs--than is sometimes let on because the decisions made by the institutions affect what their costs are. It is not just a cost push, but a pull as well. In fact, I think the pull is greater than the push.

What is going to happen in the 1990s with higher education, and what can we do about it? With the rapid increase in college tuition in the 1980s, there has been a growing concern about whether parents can afford to send their children to college. Many of you are probably parents and you share that concern. I would suggest there was another trend in the 1980s, less noticed, less visible than the growth in tuition, but possibly much more important to the economics of higher education. That trend was the startlingly large increase in all of the major revenue sources on which colleges and universities rely. Each group had an impressive rate throughout the decade of the 1980s, although not necessarily in an even pattern.

It is unlikely that the rates of growth of these revenue sources will be sustained in the 1990s. If there is a significant slowdown in revenue growth in the next decade, what can colleges and universities best do to react to this development? First, I will review the pattern of revenues in the 1980s and how these funds were spent. Second, I want to share my sense of why I do not think these patterns can be sustained over the next decade.

And finally,I want to explore what kinds of things can be done at the federal, state, and institutional level to make sure that the funds that are available are spent wisely.

As I mentioned, there was substantial growth in the 1980s in each of the major revenue sources for higher education. State funding, which is the biggest source of revenue, basically doubled, from $20 billion in 1980 to $40 billion in 1990. The real increase in state funds when measured against inflation is roughly 25 percent. Federal funding for higher education, despite what you may have read in the newspapers, also grew in real terms from slightly less than $10 billion in 1980 to roughly $20 billion in 1990. This growth occurred in both of the major areas of federal support of college education: research and student aid. I might add that it was not just in defense research, as sometimes we are led to believe. The growth of federal research dollars for universities grew at about the same pace for non-defense as for defense. The big growth in defense research in the 1980s was in what goes to the commercial enterprises.

We all know by now that tuitions also increased in the 1980s, basically growing at twice the rate of inflation; in terms of gross revenues, from about $12 billion in 1980 to about $30 billion in 1990. Endowment income and private gifts also increased as a result of the stock market in most of the decade. Even when you take into account the stock market crash in 1987, the rates of return were still quite reasonable and far in excess of inflation. Revenues from sales and services also grew in real terms, so total revenues for the whole enterprise more than doubled, from less than $60 billion in 1980 to roughly $135 billion in 1990.

Let me move to a natural question to ask at this point, paraphrasing Don Kennedy, president of Stanford University: If higher education is so rich, why do we feel so poor? The answer in part is that all of the revenues that have come in have been devoted to various purposes that colleges and universities feel are important: student aid, student services, operating facilities, the inching up of faculty salaries, and the compensation of other employees. The point that I raise in <u>The College Tuition Spiral</u> is that these expenditure patterns in the 1980s flowed from the greater availability of revenue. Without such an influx it is hard to imagine that faculty salaries could have risen as they did, or that on so many campuses we would have seen the kind of upgrading in facilities that has occurred.

Take for example the beautiful building we are in now. It is difficult to convince the public that we have a facilities crisis on our hands when they see places like this. So I think that is one of the perceptual problems that needs to be addressed. We need to try to determine what is reality and what is not.

Why is it not reasonable to expect that what happened in the 1980s will continue into the 1990s? There are several reasons not to expect the 1990s to be as good to higher education, at least in terms of resource allocation. The first reason is the recession that we are in, which will have an impact on a number of aspects of higher education finance. One is on state funding. Those of you who are in public institutions know that your basic

bread and butter is what the state provides to you. We are already seeing the effects of this slowdown in economic growth in a number of states. Virginia and New York these days are seeing not an absolute reduction, but a very substantial slowing in the growth of state funding. It is really wreaking havoc on many of the institutions in these states.

Just last week the Chronicle of Higher Education reported the annual figures that had come out on total state funding across the country. It indicated that this past year, 1990-91, state funding of higher education had grown at the lowest rate since the figures were first collected in 1958. I believe that this is only the beginning, and we are going to see even further restrictions in state funds.

In part, this is because higher education is going to be competing with a lot of other priorities that are gaining or leading while higher education has been ambling along. Prisons for one, elementary and secondary education for another--the states are just not going to be able to provide that kind of funding, especially in an environment where enrollments are not increasing. State legislatures, besieged with a number of interest groups' requests, are not likely to put a big hunk of change into an industry where there is basically a level amount of use, or possibly a decline.

The recession is also likely to have an impact on the prices colleges charge, albeit a different impact with respect to public or private institutions. The curious thing is that a recession tends to increase public tuition and tends to dampen down tuition increases in the private sector. The reason, as you well know, is that on the public side the tuitions depend upon the funds the state is willing to provide. We have gotten ourselves into a situation where we have an inverse relationship between the economy and the public sector tuitions. When the economy is going poorly, when people can least afford to pay higher tuitions, that is when we raise the tuition. In the private sector, recession tends to dampen prices because students and their parents feel they cannot pay the higher charges, and so there is an opposite effect.

What happened during the last recession in the early 1980s was that public sector tuitions went up by double digits for several years, in one year up 14 percent. On the other hand, private sector tuitions went up 8 to 10 percent. As the decade progressed and we grew out of the recession, the public sector tuitions moderated, coming down to where they are now, 6 or 7 percent a year. Private sector tuition increases tended to move at a much more level pace. A substantial recession will also take the wind out of the sails of the stock market, thereby reducing returns in terms of endowments.

The second reason why I do not think the prospects for the 1990s are so good is the federal budget deficit. It would seem obvious that if we as a nation are deep in the red, it is not likely that we will get a lot more money for higher education. But you will note that we had a pretty big deficit in the 1980s, yet I just finished saying that higher education did pretty well in the federal budget during the last ten years. One of the reasons is that although the overall budget did not go up

that much, higher education's share of the budget did. If you take the domestic discretionary side of the budget--that is, not entitlements and not defense--higher education's share went from 5 percent of that budget to 8 percent of the budget, so basically higher education did pretty well. I do not think it is reasonable to expect that they will do as well in the 1990s.

There is one thing that has not been discussed very much in all this talk about the budget deficit and the summit package and the like. There was a small budget process change, so small it was barely mentioned, that was put into that package that is going to make it much more difficult to expand the programs on the discretionary side of the budget. What the change basically says is, "Here is how much money these discretionary programs have. We will allow that to grow by inflation over a period of time, but if you want to increase, if you want to put in something new, the only way you can do it is by dedicating revenues or by stealing from some other activity within that same category of programs."

In other words, if you want to increase defense for some new bomber, you have to find it in some other part of the defense budget. If you want to increase student loans, for example, you have to find it in some other entitlement program. And if you want to increase the funding for most of the programs in higher education on the discretionary side of the budget, you are going to have to find them in transportation or something else. I do not think that in that kind of a bidding war higher education is likely to win out, no matter how good you or I think the arguments may be.

The third consideration that is going to make the prospects for the 1990s more difficult is the competitive position of many institutions as we enter the 1990s. When we were at the beginning of the 1980s, higher education was, I would say, substantially underpriced relative to its value. There had been a period of time when tuitions had increased less than inflation, so that by 1980 higher education was really quite a bargain. Some institutions perceived that, whether explicitly or implicitly, they really ought to raise their tuition in order to do the things they would like to do because the market would allow them to do that. And so they did, and they devoted a fair amount of their additional tuition dollars to student aid. They still had enough left over to do the kinds of things they wanted to do, which was raise the faculty salaries, improve their facilities, or whatever.

The difficulty is that in 1990 we are not in that situation anymore. We now have had a decade of high tuition increases. It is not reasonable to expect that people will continue to pay those high tuitions or that they will perceive that the value is such that it is worth paying those tuitions.

My greatest fear is that not so much with the elite institutions, but that the next echelon of schools get lulled into a false sense of security and feel that they did well. They did do well. They improved their faculty, they improved their facilities. They really did not substantially reduce their quality. In fact, in many cases they increased the quality of their student body, and a college president sitting now in that

chair will say, "We did well. Good job. Let's keep going." The problem is, once you go over to the other side of the mountain and start down the slope, you start being perceived as not being worth the price to a number of constituencies, and then it is extremely hard to regain your competitive position.

I think that a lot of presidents in these institutions understand this, and that is one reason why we can expect to see some amount of tuition moderation on the part of institutions. For the ones that do not moderate, I think there are going to be some problems. I can see a lot more mergers or closings in the next decade, especially as the traditional college-age population continues to decline until 1995.

Similarly, it is important is to look at the share of the budget of your institution that is devoted to student aid. In the early 1980s, at most private institutions at least, somewhere between 10 or 15 percent of the overall budget might be provided in the form of discounts for students. In that circumstance, if you raise tuition and you devote 10 or 15 percent of those additional tuition dollars to student aid, you still have 85 percent left over to do the kinds of things you want to do. But now that institution has 25 to 35 percent of its budget going to student aid. So for each additional tuition dollar, a third of it or more can get captured in the form of student aid, and they do not have as much left over to pay faculty, improve facilities, expand services, and whatever else they want to do. It is important to know how much of your budget is going to student aid now, and how much of your additional tuition dollar can you really afford to use for other purposes of the institution.

What should we do about all of this? The most important thing we can do is be smarter in terms of how we spend our money. It is not a matter of it being an insurmountable obstacle that cannot be overcome, but we do not have the luxury that we may have had in the past. We cannot afford to be inefficient, or dismiss the issue by saying that we do not work like the profit sector. In short, higher education cannot afford to just do business as usual. We need to think carefully about how we spend our resources because there are just not going to be as many resources around, at least as compared to what we have gotten used to in the past decade.

What does that mean at different levels? The federal rate, I think, needs to be reexamined. Student aid, which I am more familiar with, needs to be targeted more on the neediest students. We really cannot afford to give out subsidies to the middle class in order to placate them politically. In research we need to rethink how research facilities are funded, a subject near and dear to your hearts. We used to have a federal program for research facilities. We still do, but we spend less today on it than we spent twenty-five years ago in nominal dollars. Quite a few years ago we spent $100 million, now we spend about $50 million. You cannot really get very far on that amount of money. My concern is that the research facility enterprise is paid for largely out of indirect costs. I do not think that is a very efficient way of doing things. I think it would be much better if we tried to incorporate facilities costs to the extent that we can as part of the direct cost of a research grant.

If people are of the opinion that there is going to be this big new research facility grant program coming along that is going to save us all, they should be disabused of that notion. I realize that indirect costs is a very touchy subject. While I am not advocating an overall lowering of indirect costs, I would prefer to see a uniform indirect cost rule rather than this institution-by-institution deal where the accountants take over and decide what is the right rate. But absent the question of a uniform size, I do think that we have gotten into a bad habit of funding much or all of the research facilities either through indirect costs or through earmarked appropriations, and neither of them are good ways of doing business.

At the state level, we have to reexamine how states fund public institutions. I have mentioned that this inverse relationship between the economy and public tuitions is a bad form of public policy, socking it to the students at the worst possible time, when economic times are bad. One way of dealing with that is the approach that has been adopted in a dozen or so states, where tuition levels are tied to the funding levels in a formula sort of way. Virginia was one of the first states to do that. There is a big glitch in this type of system, however. It is great when times are good and when funds are increasing, because the institution gets more from the state and they get more from tuition because tuition is tied to the funding of the state. The difficulty is when things turn around and state funding starts to either level off or decline. Then we find that tuitions level off or decline, and you get a double hit. You lose money from the state and you lose money from tuitions, and the institution is left holding the bag.

In The College Tuition Spiral, I suggested that we should be building reserves in the good times to moderate the impact of the bad times; that is, you put aside some amount of money that was appropriated when times were good. That money would then be available to draw on when times are not so good, and therefore you could moderate the trend of the good/bad times. But one constraint in doing this is that many states prohibit the creation of reserves. In addition, people ask: "What institutional finance person in their right mind is not going to spend the money that is in the bank when they have it?" That is certainly a reasonable concern.

If reserves are not viewed as being a potential option, what about the notion of developing a special purpose bond that would be sold during economic hard times to moderate the growth in tuition for public institutions during those times. Now the kicker here would be that those bonds would have to be repaid as soon as the condition is turned around so that they would then serve as a governor on how much you would spend during the good times and therefore again serve as a moderating force. The advantage of this is that the time to implement a bond system of funding, unlike the reserves, is during the bad times; that is, rather than raise your tuitions 15 or 20 percent in order to keep your institutional budget whole, think about using this bond mechanism to moderate tuition increases. Then when things turn around, as defined by your state legislature or other governing body, then you pay back those bonds right away. True, you then

would not have the use of that first dollar of new state appropriations when the economy recovers, but it would get us out of this adverse economic situation.

I also think at the state level that we should examine the use of funding formulas that are not solely enrollment-driven. One of the arguments is that one of things that was different in the 1980s from earlier times was that we stopped growing, that in the 1960s we had lots of enrollment growth, in both the public and private sectors. And that growth allowed many schools to spread their fixed costs over a wide number of students and therefore increase their expenditures more than they had in tuition. In the mid-1970s and into the 1980s we stopped growing and no longer had the luxury of spreading our fixed costs over a growing number of students. The difficulty with a state enrollment-driven formula is that it is murder when you start going down. It is worse than all this other funding formula business I was talking about before. Something that does not just go up and down with numbers but provides some incentives for cost savings would be a terribly good idea to at least experiment with at this time.

Which brings me to the responsibility of higher education institutions themselves. I started out by saying I think you and the other officials at colleges and universities are much more sophisticated today than was the case ten or twenty years ago, and I think the 1990s are going to provide a much greater challenge than we have had so far in terms of seeing how you can make the revenues that you do have go further. I am not knowledgeable enough in your areas of expertise to suggest to you how you will go about doing that, but I would conclude by saying that it is very important that you do it because otherwise higher education is going to be in a whole heap of trouble.

Making Tough Budget Choices

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Meg Greenfield, in her column in the October 15, 1990, issue of Newsweek magazine, reflected on the vast political changes which had occurred in many countries throughout the world during the previous year. She went on to state that despite the contrast in the stories that had appeared in the newspapers and magazines in the fall of 1989 about world tensions, ".....so far as domestic fiscal policy is concerned, nothing has changed at all, except possibly to get worse, and the assumption of being stuck in the same place forever may have something to it."

Citing the current budget struggle going on in Washington during the fall of 1990, she said, "Perhaps it will turn out to be the one truly immutable aspect of our universe. The second is how totally preposterous it is.....we are the richest country in history.....and yet we still can't manage.....to rebuild our collapsing bridges....."

Meg Greenfield was, quite clearly, addressing a problem which is being faced not only by the government but by most not-for-profit institutions. The question may be, as Meg Greenfield implied, not whether there are sufficient funds available to meet all pressing needs but, rather, whether we, the not-for-profit institutions, like the government, have the ability to allocate our resources where they are needed most. Colleges and universities may have, in fact, sufficient wealth to meet realistic facility and other needs and yet not have the ability to reach consensus on where and how and when funds should be spent to meet these needs because they cannot make the tough decisions required by this process.

There are many real financial concerns facing most colleges and universities. Perhaps the following text will

identify some of the problems and offer a few suggestions on how these institutions might address these problems.

KEY FINANCIAL ISSUES

At the Association of Physical Plant Administrators of Colleges and Universities (APPA) Institute in Chicago last August, the 60 or so participants in my class on Principles of Budgeting and Accounting identified the following five issues as being the most important financial concerns facing them in their operations. (The list is ranked in the order of priority indicated by the class.)

1. Lack of adequate funding.
2. Untimely budget/expense information.
3. Unanticipated expenses.
4. Overruns on budget items.
5. Uncontrollable expenses.

If one looks closely at this list, one can argue that all but the last item (uncontrollable expenses, such as the increase in the price of oil) can be managed through sound budgeting and accounting processes. The impact of the last item can be controlled or at least lessened by other efforts such as a sound energy management policy.

Lack of Adequate Funding - When one examines what is meant by "lack of adequate funding," one finds it often means either "we did not get all we asked for" or "we must make do with less." What it probably means, in reality, is that the institution's anticipated revenues for the coming year were not sufficient to meet its plans and ambitions as reflected by the institution's proposed budget. Budget cuts were necessary and the cuts were more than likely made by implementing an across the board percentage reduction of every department's request. A simple, but totally inadequate method for achieving budget reductions in today's demanding world of financial management.

Untimely Budget/Expense Information - The members of the class pointed to the problems they experience when, despite the increased availability and use of computer systems, finance and/or purchasing departments do not furnish in a timely manner meaningful information by which to manage. Operating managers need to know where they stand with respect to their budget at all times. Managers must think in terms of committed or obligated expense. It is less relevant for a manager to know when the bills are actually paid.

Unanticipated Expenses - Changes in operations and priorities dictated by the changing scene on the college campus usually impact the financial operations of the college. Fewer admissions acceptances, overruns in other state operations requiring slashes to the budget mandated by a governor or state legislature, and new governmental regulations such as those dealing with asbestos, all impact already tight budgets. Although these changes are often difficult to implement and/or recover from, management has the responsibility to rethink their plans and budget to find ways of accommodating those items which are absolutely necessary.

Overruns on Budget Items - Clearly, budget overruns are the result, in most cases, of a lack of control on the part of management. Whether it is an improper estimate in the beginning or a failure to monitor expense during the operation or throughout the fiscal year, overruns normally can be traced to a breakdown in an operational function.

FINANCIAL PLANNING PRINCIPLES

How do we deal with these issues? Let's look at a few financial planning principles.

Principle #1 - SECURING ADEQUATE ANNUAL FUNDING IS THE RESPONSIBILITY OF FACILITIES MANAGEMENT.

Those of us who deal with the maintenance and operation of facilities must recognize that it is our responsibility to secure adequate annual funding to enable us to carry out the college's facilities management plans and objectives for the coming year. We must, first of all, create a plan that recognizes the importance of providing a safe and attractive environment in which to teach and to learn. The competition to attract students and the competition students will face in the world demand nothing less. Attempting to achieve this objective means facilities managers must use every sound management technique within their control to do this job and do it well.

Principle #2 - FACILITIES ARE ONE PART OF THE WHOLE. Despite a facilities manager's sense of how important properly maintained facilities are to an institution both now and in the future, facilities managers must recognize their operations are but one part of the institution's reason for being. Other elements that make up the total institution feel just as strongly about their role in the success of the institution.

Thus, facilities managers operate in a very competitive environment. They must work hard to make sure they do the very best job possible in producing and substantiating budget requests if they are to compete with the other players who are also looking for their slice of the budget pie.

Principle #3 - THE "TEAM APPROACH" WORKS BEST. Those of us who have management responsibilities for facilities maintenance and operations must recognize that every member of our organization (including the managers, the supervisors, the foremen, and every individual, custodian, tradesperson, groundsworker, etc.) needs to understand and have a say in the budget process. Too often we assume non-management employees are not interested in the budget and that the preparation of the budget is a task reserved solely for management.

This is an assumption that must change. Every member of the facilities team needs to understand and help define the objectives for the coming year. Employees need to be asked for their suggestions about improving productivity, the use of new tools and equipment, their ideas about new ways of doing the same old tasks, and ways in which the department can become more responsive and efficient. Employees have good ideas and they need to be heard for they are the ones who actually spend the budget dollars. In one sense, they have more control over budget expenditures by their direct actions than any member of the management team. They are the cost centers.

If they are involved to the extent they have an understanding of what the budget requests are going to be, they also will have a better understanding when all of the budget requests have not been approved. They will know, if the information is shared with them, why the department did not receive full funding and what the department must do to work within the reduced funding. In all probability, they will even have suggestions on ways in which the work can be accomplished with fewer resources.

If they are allowed to become part of the team, they will, in fact, be more likely to be supportive of the work necessary to overcome budget reductions.

Principle #4 - FACILITIES MANAGERS MUST BE CREATIVE IN THEIR PRESENTATION OF BUDGET NEEDS.

As I indicated in Principle #2 above, facilities managers find themselves in very competitive positions. We must think of ways in which to convey the true needs of the department to those empowered to allocate funds.

If it is difficult to get the president, the trustees, and/or other administrators into the field to see the conditions that need attention, take the conditions to their offices. Prepare a brief videotape that shows the cracked flashings, the masonry cornices and chimneys that need to be repointed, the bathroom fixtures and partitions that need attention, the roofs that need replacement, etc., etc., and present the video to the board. For one thing, board members probably receive similar presentations in their boardrooms. They are receptive to this form of substantiation.

Well documented, well substantiated budget requests have a far better chance of being approved than those less documented, less plausible requests.

Principle #5 - YOUR RELATIONSHIP TO THE FUNDING AUTHORITY IS CRITICAL. If you are concerned about obtaining adequate annual funding, you must be concerned about your relationship to the funding authority. To you, the funding authority may be the person to whom you report.

But you must think also in terms of the ultimate funding authority, perhaps the board of trustees or the state legislature. You need to take advantage of every opportunity you either have or can generate in order to protect your interests if a decision must be made to fund one request over another. Make sure you cultivate good relationships with all concerned.

OPERATIONS - NOMINAL ACCOUNTS

Every institution has its revenue sources. Revenue (all monies flowing into the institution) is usually tracked through "fund accounting." Funding of operations is tracked through "nominal accounts." Nominal accounting provides a system for allocating the revenues coming into the institution which are then assigned to various operations. The finance department can track these funds through accounting principles applied to the operations. The net result, once expenses are deducted, is either a positive variance (underrun) or a negative variance (overrun) of the budget.

Reflect Planning - Objectives and operations planned for the coming year should be reflected in sound budgeting and accounting techniques. The budget should be a financial plan based on the need to accomplish well established short-term and long-term objectives.

Measurement of Performance - Nominal accounting applied to operations allows those of us who manage and those who evaluate management to assess our abilities as effective managers. In other words, it is a way for everyone to measure and evaluate performance.

Industry places great emphasis on one's ability to manage their operations within their budget. One's ability to manage within budget often is the single most important factor that determines the individual's level of performance for the year and subsequent value to the organization. Perhaps those of us at not-for-profit institutions need to think more like industry in this regard.

Control - Nominal accounting also allows us to exercise control over our operations. By having up-to-date commitment accounting records, managers can exercise the level of control

necessary to assure themselves they can accomplish their objectives without exceeding the funds allowed for the operation.

By implementing purchasing controls, reserve account controls, controls on positions, and other sound management techniques, one can be assured of keeping the operations within budget.

FINANCIAL TERMINOLOGY AND PROCEDURES

It is important for managers to become more familiar with financial terminology and procedures in order to encourage that sound financial practices be implemented. New projects require the examination of new methods of funding.

Revenue/Expenses/Income - Typically, all of the monies flowing into an institution are classed as revenue. All of the monies flowing out of the institution are typically classified as expenses. If, at the end of the fiscal year, revenue exceeds expenses, we have a positive income variance. If expenses exceed revenue, we have negative income and there is a need to generate additional revenue. We often are more lenient towards excessive expenses at the beginning of the year which usually creates problems at the end of the year. Budget expenses need to be annualized at the beginning of the fiscal year so final costs can be projected accurately throughout the year.

Cash Flow - Cash flow is critical to every industry and colleges and universities are no exception. It is important that revenue flowing into the institution exceeds the revenue flowing out as expenses. A healthy (positive) cash flow is essential to every well run business operation.

Depreciation - In 1985, in a talk at Bryn Mawr, I advocated the establishment of depreciation accounting in colleges and universities. Those institutions that do charge the various user departments for the deterioration of the buildings they use are generating depreciation funds. If set aside annually from the completion date of a project, these funds, if held in a building maintenance reserve account, will provide sufficient funds when they are needed to properly maintain the facility.

Income Stabilization Fund - At Colonial Williamsburg, we saw the wisdom of establishing a fund that would allow the Foundation to ride through a period when visitation might be less than anticipated under the budget. Such a fund, if applied to a college or university, would allow the college or university to ride out short periods of decreased enrollment, declines in development office fund raising, increases in the price of oil or other fossil fuels used to heat the facilities, and other similar, one-time events. In order to generate these funds, the institution must discipline itself to set a portion of its

revenue aside each year until the stabilization fund is built up to the level needed to carry them through an off year.

Planned Reductions - Rather than implement across the board percentage reductions when it becomes necessary to reduce budgets, the institution or, if the institution does not choose to do so as a whole, the individual departments, would be much better off if they called for a list of possible budget reduction items ranked in order of least importance from each of their cost centers. This would allow management (under the team approach) to review the proposed reductions and select those which would have the least impact on the facility department's overall plans and objectives for the coming year. Rather than be arbitrary and incur reductions which make it more difficult to achieve objectives, emphasis is placed on those things which can be accomplished without decreasing the effectiveness of the department.

RENEWAL AND REPLACEMENT OF PHYSICAL ASSETS

Financing for operations and maintenance is only one portion of the financing necessary to maintain the institution's facilities in perpetuity. Most institutions intend to exist in perpetuity. It is only reasonable, then, to attempt to achieve the maximum longevity for each of the institution's facilities. In order to do this, buildings, utilities, roads, walks, and other infrastructure must be constantly renewed and replaced. Without such a program, buildings continue to wear out or become obsolescent. The colleges or universities very valuable physical assets deteriorate and decline in value.

Buildings are also subject to new code requirements such as access for the disabled, asbestos removal requirements, sick building syndrome problems, and other legislation aimed at providing for the safety and security of occupants. Still other buildings become too expensive to maintain and operate by contemporary standards.

All of these things dictate that a renewal and replacement program should be implemented.

Building Audit - The first step to be undertaken in any such program is to perform a building audit. Each major building on the campus must be physically inspected by a building audit team in order to identify and record the general condition and remaining useful life of each of the building's many components. An estimate of cost must be assigned to each of these components depending upon the degree of renewal or replacement work required to bring the building up to present day standards.

The building audit can be performed entirely by institution staff or by a combination of a professional consultant and key facilities staff personnel who are familiar

with the buildings and their component systems. All of the data collected through the inspection process should be put into a computer program designed to provide maximum analysis capabilities.

In addition to establishing the cost of each item of work, the useful life remaining for each item should be used to establish a schedule for the renewal and replacement project. This schedule will enable the building audit team to compute the total annual cost of the work for the first five and then second five year period of time from the date of the audit. A ten year projection is sufficient as it is not possible to accurately project the items of work that will be needed nor is it realistic to estimate the cost of that work beyond ten years.

Presentation - Once the building audit is complete, a report should be prepared and shared with other members of the institution's management team. Presentations to the senior management, the president, and the board of trustees or state legislature (the funding authorities) of the institution should be made as soon as possible so these individuals are well aware of the magnitude of the problem facing the institution. The presentation should include projections for the amount of funds needed over the ten year span. The request should be realistic and in line with the amount of work the facilities department can be reasonably expected to complete. It makes no sense to ask for more funds than the department is capable of expending efficiently.

Funding - Each institution has a certain capacity to fund operating expenses and capital expenses. Renewal and replacement projects fall into the second category. Many options exist for funding work of this nature in today's financial markets. Depending upon circumstances, an institution does not need to fund this work out of their endowment although that might be one alternative. There are many creative, sound investment options which should be explored and will be explored in subsequent chapters of this document.

SUMMARY

In summary, those charged with the proper maintenance of college and university facilities must employ sound financial principles to their ongoing efforts to see that their campuses are well maintained. They must also be creative in developing their operations, maintenance, and renewal and replacement plans, seeking alternative ways of accomplishing their tasks through creative and sound use of the financial resources at their disposal.

Hard choices must be made; choices which affect the faculty as well as the administration of the organization.

In a recent study performed under a grant from The Pew Charitable Trust, the panel performing the study concluded that the responsibility for placing colleges and universities on a better financial footing rests with both the faculty and the administrative functions of the institution. Both are dependent on one another and both must accept responsibility for the work that must be done in their respective areas. Only by stopping (and reducing) the growth of faculty and administrative staff, through their mutual team effort, can an institution achieve the financial equilibrium which will be so essential to the institution's ability to maintain its facilities in perpetuity.

With a successful effort in this endeavor, and with the application of the principles cited above, the facilities managers of tomorrow can fully discharge their responsibilities in a manner appropriate to protect the institution's physical assets in perpetuity.

Although she was not referring to college and university campuses, Meg Greenfield's theory is right. We probably have the resources we need to rebuild our collapsing campuses if only we make the hard choices and use our resources wisely.

Appendix: Principles of Accounting

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Objectives of Financial Reporting

Regardless of the type of organization, whether it is a commercial enterprise or a non-profit organization, a need exists for financial reporting. Appropriate information is required to assist management in resource allocation and to provide a means to aid management and others in understanding the financial condition and operations of the entity.

In a commercial enterprise setting, the emphasis for financial reporting focuses on needs to maintain and enhance the capital structure of the enterprise, to assist those in control of the entity to operate at a profit which then can be returned to the owners, and to generate resources to further the growth of the firm.

In the non-profit institution, the emphasis in financial reporting centers is focused on three activities. Assisting the institution in securing sufficient resources to allow the institution to provide an appropriate number of services at an acceptable level so that the basic purposes of the institution are fulfilled is certainly a high priority if not the most important justification for financial accounting and reporting. Ensuring that revenues provided for specific purposes are expended in consonance with the terms upon which the providers made them available is a necessary and important consideration. Providing proper accountability for the use of all funds made available to the institution to its various publics should be a requirement of all such institutions.

Accountability Measured

Just as the objectives of financial reporting differ by type of institution, the measures of accountability of the different institutional types are also different. In the commercial institutional environment, this accountability is manifested by such measures as profit, return on equity, and earnings per share. In the not-for-profit environment, accountability is judged on the basis of efficient use of resources, effective use of

resources, and the use of funds in accordance with the provisions upon which they were provided.

In the college and universities, fund accounting is utilized for that sector of not-for-profit institutions. In fund accounting, a fund is established to provide for the each basic purpose for which resources are provided the entity. The fund provides a vehicle to properly account for all resources received and utilized by the institution.

From an accounting standpoint, each fund takes on the financial characteristics of a separate business. Each fund possesses assets (things of value in the control of the fund), liabilities (amounts owed by the fund to others as a result of the acquisition of assets or as a result of the conduct of business by the fund), and a fund balance (the fund's ownership interest or equity in the assets. As a basic financial equation, the assets of a fund are equal to the sum of the amounts owed to others and the fund balance or equity in the fund. Each fund may have revenues (additions to the fund) and expenditures (deductions from the fund).

Fund Groups of Colleges and Universities

Colleges and universities have several fund groups to accomplish the purposes mentioned above: current funds, loan funds, endowment and similar funds, annuity and life income funds, plant funds, and agency funds.

The current funds group are the funds which typically have the greatest level of activity each year, are generally under the greatest scrutiny, and are often referred to as the operating fund. Within the current funds grouping are two subgroups-unrestricted current funds and restricted current funds which are established in the accounting records as separate funds.

Unrestricted current funds provide for the accounting for those resources on which no external restrictions have been placed. Correspondingly, restricted current funds provide for those resources on which some external restriction has been placed. These restrictions may be either narrow (such as "for a scholarship for those preparing to be physical plant directors") or broad (such as "for scholarships").

The loan funds group provide for those funds under the control of the institution the purpose of which are for lending to students to support their enrollment at the college or university. While there are a number of loan sources for students, it is important to note here that these funds are under the control of the institution. The borrowers are selected by and the loan disbursements are made by the institution. The provider of the loan funds to the college or university may impose certain stipulations on the lending of these funds and it is incumbent upon the institution to comply with these externally imposed restrictions in the administration of the fund.

Loan funds are of two general types. A number of colleges and universities participate in the Perkins loan program which is the successor program to the National Defense Student Loan program instituted by the federal government in the 1960's and later renamed the National Direct Student Loan program. The second subgroup of loan funds comprise the institutional loan program which are formed as a result of the generosity of individuals/groups who have provided these funds to be loaned to students to help finance their education.

Endowment and similar funds consist of those funds provided to the institution which generally are to be held rather than expended, invested, and the income earned on the investment utilized to support the work of the college or university. There are essentially three types of endowment funds-(1)permanent endowment,(2) term endowment, and quasi-endowment. As indicated by their grouping, permanent endowment funds are just that-in perpetuity, the principal of the funds provided are not to be expended by the institution.

Term endowment, on the other hand, are to be held and not expended until the occurrence of some specified event at which time the institution is to act in accordance with the agreement made at the time the term endowment funds were accepted by the institution. An example of a term endowment fund could be funds provided to purchase library books upon the completion of a library structure at the institution. In this example, the donor of these funds agreed to allow the earnings on the library acquisition fund support the cost of the building during construction (the endowment nature alluded to above)but upon completion, the funds cease to

be endowment (conclusion of the term) and are used to secure some library holdings to be housed in the new structure.

Quasi endowment funds or "funds functioning as endowment" represent those unrestricted funds of the institution placed in the endowment fund by the governing board which can be withdrawn at a later date for other uses. During such time that the funds are part of the endowment fund, typically, the funds so transferred are not expended but instead the earnings thereon are utilized by the college or university to support its activities in the manner stipulated by the governing board.

The annuity and life income funds grouping contain those funds donated to the college or university with the agreement that the institution will provide an agreed upon amount of income to a designated beneficiary until some future event occurs. Typically the beneficiary is the donor and/or the donor's spouse. The future event is frequently the death of the designated beneficiary(s). The agreement reached between the college/university and the donor provides for the disposition of the donated funds (i.e., what use the institution may make of the donated funds) at the attainment of the future event.

There are four general types of annuity and life income funds and the college/university may choose to offer one or more of these to their prospective donors- the charitable gift annuity, the charitable remainder annuity trust, the charitable remainder unitrust, and pooled income funds.

The charitable gift annuity provides for a fixed payment amount to the designated beneficiary during the life of the agreement. The requirement to make these payments is a general obligation of the issuing college/university.

The charitable remainder annuity trust is similar to the charitable gift annuity with the difference being that the requirement to make payments to the beneficiary is limited to the assets of the annuity trust. Payments to the beneficiary are a fixed amount and continue so long as there are assets in the trust or the attainment of the future event, whichever occurs first.

The charitable remainder unitrust provides for the payment of a percentage of the market value of the trust valued on at least an annual basis. Some agreements are written so that the payment amount is the lessor of the stated percentage or actual income. The requirement to make payments to the beneficiary continue so long as there are assets in the trust or the attainment of the future event, whichever occurs first.

Pooled income funds provide for a donor to add to the fund and receive a pro rata share of the earnings of the fund until the attainment of the future event. As can be seen, there is no contractual commitment to provide a level of income, simply that the donor will receive the equitable portion of the earnings from the investments of the fund.

The Plant funds group consists of four subgroups the composite of which provide the accounting mechanism for the acquisition and ownership of land, buildings, and improvements thereon. The four subgroups are the unexpended plant fund, renewal and replacement fund, retirement of indebtedness fund, and the investment in plant fund. As with the major fund groups, each subgroup is a self-balancing fund with assets, liabilities, fund balances, revenues, and expenditures.

The unexpended plant fund is the fund which is principally utilized to provide for new plant facilities. The fund may also be utilized for other plant needs such as accounting for major renovations to existing plant facilities.

The renewal and replacement fund is utilized ,as its name implies to account for the refurbishing of plant facilities. This fund grouping is generally utilized if such is required by the provisions of agreements underlying the financing of renewal and/or replacement projects and in those other instances where a significant number of projects of this nature will be accomplished over a period of time and there is a need to assure that readers of the financial documents are aware of these activities.

The retirement of indebtedness fund arises where borrowing has been the means of providing for the improvement of plant assets. Additions to this fund group may come from charitable contributions. Most frequently,

however, additions come from transfers from the current fund group. Deductions from this fund are the principal and interest payments to the lender over the life of the loan.

The investment in plant fund group is the fund where all appropriate costs of the acquisition and development of plant assets is reflected. Additions to this fund occur principally from transfers from the current fund group (where small equipment is typically acquired) and the unexpended plant fund as acquisition of more major plant items and major improvements have been initially recorded. Deductions from this fund group occur generally from the retirement of assets at the end of their useful lives.

Current Funds

As indicated under the definitions of fund groups, there are two subgroups under the current fund. Unrestricted resources are considered revenues and expenditures as they are earned and expended during a reporting period. Restricted resources are included to the extent that the restrictions accompanying their receipt have been fulfilled and to the extent that corresponding expenditures have been made during the reporting period.

Revenues are summarized into four major groups reflecting their basic nature as they relate to the purposes for which the institution was founded-educational and general, auxiliary enterprises, other sources, and independent operations.

Educational and general revenues comprise the primary source of support for colleges and universities. Included in this category are tuition and fees, appropriations, grants and contracts, private gifts, grants, and contracts, endowment income, and sales and services of educational activities.

Tuition and fees essentially provide for student charges for academic instruction and are a significant source of revenue for public institutions and is the major source of support for private institutions.

Appropriations (federal, state, and local) represent those funds set aside by the various levels of

governmental agencies to provide support to public colleges and universities.

Grants and contracts (federal, state, and local) are subsections to recognize this type of support from the various levels of governmental agencies. Private gifts, grants, and contracts are a significant source of support for higher education and are generally summarized into unrestricted and restricted categories to reflect this important distinction.

Income from the institution's endowment (both unrestricted and restricted) is a significant source of support for private institutions and a growing source of support for public institutions. This revenue represents the disbursement of conventional income (such as dividends, interest, rents and the like) to the current fund and does not include any transfer of capital gains realized from the profitable sale of endowment fund assets. Any such amounts included in the current fund operations would be treated as a transfer from the endowment fund rather than as revenues to that fund.

Sales and services of educational activities includes those revenues that are incidental to the primary purpose of the institution but that are nonetheless related to that purpose. Examples of these revenues are fees from testing services and sales of literary publications.

Sales and services of auxiliary enterprises represent the second largest category of revenues on most college and university campuses. These revenues arise in support of the primary mission of the institution but they are nonetheless "auxiliary". Typically these are activities that exist to provide goods and services to students, faculty, and staff and that charge fees that are related to the cost of the goods and services being provided. Typical are residence halls, dining halls, snack bars, bookstores, and intercollegiate athletics. Some institutions may have hospitals which are an integral part of the college or university and dependent upon its role in the life of the institution, it may be a source of revenue as well.

In the other sources of revenue category typically found on college and university campuses are such items as earnings on the temporary investment of operating

funds, parking permits, library fines, and miscellaneous sales.

The final major category of current funds revenues is that of independent operations. This category is not typically found on college and university campuses but where substantive activities are conducted which have no integral relationship to the primary mission of the institution, these revenues should be included here. An example of such an activity might be the conduct of a major externally funded research project which is not related to the basic purpose of the institution.

Expenditures and transfers are separated into the two categories however both represent reductions to assets and revenues.

Expenditures are subdivided into two major groupings similar to the divisions in revenues-educational and general, and auxiliary enterprises.

Educational and general expenditures, as with their revenue counterparts, provide an orderly means of recording those expenditures that are directly related to the basic purposes of the institution. Included are expenditures for instruction, research, public service, academic support, student services, institutional support, the operation and maintenance of the physical plant, and scholarships and fellowships.

Included in the instruction category are all types of instructional expenditures such as those incurred for general academic instruction, vocational/technical instruction, special session instruction (summer sessions and the like), community education, and preparatory and remedial instruction.

Research expenditures include both institutionally funded as well as externally funded activities. While all such expenditures should be reflected in this category, as a practical matter, some institutions do not segregate the institutionally supported activities from the instructional expenditures incurred by the academic department.

Included in the public service area are such items as community services, cooperative extension services, and public broadcasting services.

The academic support group contains activities such as libraries, museums and galleries, educational media services, academic computer support, academic administration, and academic personnel development.

Student services expenditures consist of those incurred in overall student services administration, social and cultural development (cultural events, student newspapers, intramural athletics, and student organizations), counseling and career guidance, financial aid administration, student admissions, student records, and student health records.

Institutional support provide for those that are of a general nature as they relate to the organization-executive management (president, chief academic officer, chief business officer, chief student services officer, and the chief development officer), fiscal operations, general administration and logistical services (such as personnel administration, purchasing office, and printing services), administrative computing support, development, and public relations.

Expenditures relating to the operation and maintenance of the physical plant including building maintenance, custodial services, utilities, landscape and grounds maintenance, major repairs and maintenance, and other similar activities are grouped together to aid in understanding the cost of operating the facilities which house the educational process.

The scholarship and fellowship category summarizes the costs incurred in providing student financial aid support from funds under the control of the institution.

Auxiliary enterprises expenditures are those which match those as identified as revenue sources and include such activities as residence halls, dining halls, bookstores, faculty housing, and intercollegiate athletics. The easily identified costs of providing the service as well should be the costs of space utilized and general management costs should be included here in order that an accurate picture of the total costs and the net financial results of the activity can be seen.

The last two major expenditure categories are hospitals and independent operations. The expenditures incurred in providing services in these areas, when

viewed with the corresponding elements of revenue as described earlier, provide the reader with a reasonable measure of the financial results in these areas.

Transfers as a category represent those amounts that are moved between fund groups. These transfers may be either mandatory or non-mandatory in nature.

Mandatory transfers are those which are required by the agreement made at the time assets were provided to the institution. Examples are transfer from the current fund to the retirement of indebtedness fund to provide for the periodic repayment of funds borrowed from an external source to construct buildings. Another example of a relatively common transfer in colleges and universities is that required by the Perkins student loan program.

Non-mandatory transfers are those made by the institution by its desire rather than being required to by an external source. Examples are transfer of amounts from other fund groups to "function as endowment" or transfers of amounts from a fund group to the plant fund to provide for renewals and replacements.

Summary

Some system is required for the financial transactions of an entity to be understandable to the reader. In higher education, the first semblance of order is the categorizing of transactions by basic purpose into fund groups. The preponderance of transactions in the current fund group necessitates a much further delineation of these activities. An order is created both for revenues and expenditures that facilitates analysis of results. This structure provides a basis for gauging the financial health of the institution, and provides a basis for financial planning, both short and long range to assist the institution in accomplishing its long term goals and mission.

Bibliography

Albani, Suzanne B. "Rehabilitating Campus Buildings with Investment Tax Credits." Business Officer, March 1983.

American Council on Education. "Special Focus: Rebuilding the Nation's Campuses." Educational Record, Winter 1989.

Anderson, Henry R. and Mitchell H. Raiborn. Basic Cost Accounting Concepts. Boston: Houghton Mifflin Co., 1977.

Anthony, Robert N. and David W. Young. Management Control in Nonprofit Organizations, third edition. Homewood, Illinois: Dow Jones-Irwin, 1984.

Association of Physical Plant Administrators of Universities and Colleges. Comparative Costs and Staffing Report for College and University Facilities. Alexandria, Virginia: APPA, biennial.

---. Work Control. (Critical Issues in Facilities Management series.) Alexandria, Virginia: APPA, 1988.

---. Capital Renewal and Deferred Maintenance. (Critical Issues in Facilities Management series.) Alexandria: APPA, 1989.

---. Management Basics. (Critical Issues in Facilities Management series.) Alexandria, Virginia: APPA, 1990.

---. Energy Management. (Critical Issues in Facilities Management series.) Alexandria, Virginia: APPA, 1990.

---. Planning, Design, and Construction. (Critical Issues in Facilities Management series.) Alexandria, Virginia: APPA, 1990.

Bowman, William W. "Defer Maintenance, Invite Disaster." AGB Reports, November/December 1977.

Boyer, Ernest L. College: The Undergraduate Experience in America. New York: Harper & Row, 1987.

Calgaard, Ronald. "The View From the Top: A President Looks at Facilities Management." Facilities Manager, Winter 1987.

Carnegie Foundation for the Advancement of Teaching. "How Do Students Choose a College?" Change, January/February 1986.

Chronicle of Higher Education. "Our Crumbling Campuses: Colleges Scrabble for Money to Reduce Huge Maintenance Backlog" and related articles. October 10, 1990.

Collins, Stephen J. and Robert T. Forrester. Recognition of

Depreciation by Non-Profit Institutions. Washington: National Association of College and University Business Officers, 1988.

Dearden, John. Cost and Budget Analysis. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1978.

Dillow, Rex O., ed. Facilities Management: A Manual for Plant Administration, second edition. Alexandria, Virginia: APPA, 1989.

Dingman, Robert M. Regulatory Compliance for Facilities Managers. Alexandria, Virginia: APPA, 1989.

Dobler, D.W., L. Lee Jr., and D.N. Burt. Purchasing and Materials Management, fourth edition. New York: McGraw-Hill, 1984.

Dunn, John A. Jr. "Plant Upkeep and Financial Equilibrium: How Much Should Institutions Be Spending?" Business Officer, September 1987.

---. Financial Planning Guidelines for Facility Renewal and Adaption. Ann Arbor, Michigan: Society for College and University Planning, 1989.

Fackler, F. Louis. "Alternate Financing of Campus Projects." In Proceedings of the 71st Annual Meeting of APPA. Alexandria, Virginia: APPA, 1984.

Financial Accounting Standards Board. Recognition of Depreciation for Not-for-Profit Organizations (FASB Statement No. 93). Stamford, Connecticut: FASB, 1987.

Forrester, Robert T. A Handbook on Debt Management for Colleges and Universities. Washington: NACUBO, 1988.

Gretchen, Stephanie. "Attaining Facilities Equilibrium: The Institute for Facilities Finance." Facilities Manager, Winter 1991.

Gullette, Jon M. "Vanderbilt University's Deferred Maintenance Study." In Proceedings of the 74th Annual Meeting of APPA. Alexandria, Virginia: APPA, 1987.

Hascall, Robert S. "Attacking the Capital Renewal Dilemma." APPA Newsletter, November 1985.

Heintzelman, John E. The Complete Handbook of Maintenance Management. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1976.

Helpern, D.P. The State of College and University Facilities. New York: SCUP, 1987.

Hewitt, Clinton N. "Campus Renewal in the 1980s: The New Voyage of the Beagle." In Responses to Fiscal Stress in Higher Education, Robert A. Wilson, ed. Center for the Study of Higher

Education, University of Arizona, 1982.

Horngren, Charles T. and George Foster. Cost Accounting: A Managerial Emphasis, sixth edition. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1987.

Howard, Steve. "The Director as Planner: A Profile of Rhodes College." Facilities Manager, Spring 1986.

Jenny, Hans. H., with Geoffrey C. Hughes and Richard D. Devine. Hang-Gliding or Looking for an Updraft: A Study of College and University Finance in the 1980s--The Capital Margin. Wooster, Ohio: The College of Wooster, 1981.

Jones, Phillip A. Sr., Clarence R. Jung Jr., and Herbert C. Peterson. "Why Not Depreciate and Why Not in Operations?" Business Officer, April 1989.

Kaiser, Harvey H. Mortgaging the Future: The Cost of Deferring Maintenance. Washington: APPA, 1979.

---. "Funding of Facility Repairs and Renovation." Business Officer, January 1982.

---. Crumbling Academe: Solving the Capital Renewal and Replacement Dilemma. Washington: Association of Governing Boards of Universities and Colleges, 1984.

---. Facilities Audit Workbook: A Self-Evaluation Process for Higher Education. Alexandria, Virginia: APPA, 1987.

---. The Facilities Manager's Reference. Kingston, Massachusetts: R.S. Means Company, Inc., 1989.

Kaiser, Harvey H., ed. Managing Facilities More Effectively. (New Directions for Higher Education quarterly.) San Francisco: Jossey-Bass, Inc., 1980.

Karol, Nathaniel H. "Direct Costing of Facilities-Related Costs." Business Officer, November 1981.

Kershner, Earl Gene. "Why Do University Buildings Cost So Much?" Business Officer, April 1987.

Landry, Lawrence L. and Rodney Mebane. "Money for Old Main." AGB Reports, March/April 1982.

McClintock, David L. Formula Budgeting: An Approach to Facilities Funding. Washington: APPA, 1980.

McCullough, Jim and Pat Dennis. Academic Research Facilities: Financing Strategies. Report of a Conference. Washington: National Academy of Sciences, 1986.

McKeown, M. and K. Alexander. Values in Conflict, Funding

Priorities in Higher Education. Cambridge, Massachusetts: Ballinger Publishing Company, 1986.

McLeod, Marshall. "Financial Planning and Budgeting: Twelve Sins to be Avoided in Times of Economic Stress." Planning for Higher Education, December 1980.

Meisinger, Richard J. Jr. and Leroy W. Dubeck. College and University Budgeting. Washington: NACUBO, 1984.

Meyerson, Joel W. "Top Ten Concerns for Trustees in 1988." AGB Reports, March/April 1988.

Mutch, William S., Thomas G. Nycum, Leonard V. Wesolowski, and James R. Fountain. "The Cost of Depreciation: 4 Responses to FASB Statement 93." Facilities Manager, Fall 1987.

National Association of College and University Business Officers. Contracting for Services. Washington: NACUBO, 1984.

---. "Billions Needed for Research Facilities, According to Report." Business Officer, August 1986.

---. "Government Should Pay for Updating Research Facilities." Business Officer, November 1986.

---. "FASB Proposes Requiring Recognition of Depreciation Costs." Business Officer, February 1987.

---. "Issues in Accounting Depreciation." Business Officer, March 1987.

---. "FASB Receives Negative Replies on Depreciation Accounting." Business Officer, May 1987.

---. "Building Deterioration on Campus is Hidden Crisis; Boom Seen." Business Officer, September 1987.

National Science Foundation. Scientific and Engineering Research Facilities at Universities and Colleges: 1990. Washington: NSF, 1990.

---. Scientific and Engineering Research Facilities at Universities and Colleges: 1988. Washington: NSF, 1988.

Petty, J.W. et al. Basic Financial Management. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1986.

Robinson, Daniel D. Capital Maintenance for Colleges and Universities. Washington: NACUBO, 1986.

Rush, Sean C. and Sandra L. Johnson. The Decaying American Campus: A Ticking Time Bomb. Alexandria, Virginia: APPA, 1989.

Rush, Sean C. et al. Managing the Facility Portfolio. Washington:

NACUBO, 1991.

Sherman, Douglas R. and William A. Dergis. "Funding Model for Building Renewal." Business Officer, February 1981.

Shirk, Gary M. Financing New Technologies, Equipment/Furniture Replacement, and Building Renovation: A Survey Report. College and Research Libraries, 1984.

Suber, L. Terry. "Coping with Deferred Maintenance." Business Officer, May 1982.

Welzenbach, Lanora F., ed. College and University Business Administration, fourth edition. Washington: NACUBO, 1982.

Werner, Thomas. "Things Fall Apart." American School and University, February 1984.

Weston, J.F. and E.F. Brigham. Managerial Finance. Hinsdale, Illinois: Dryden Press, 1981.

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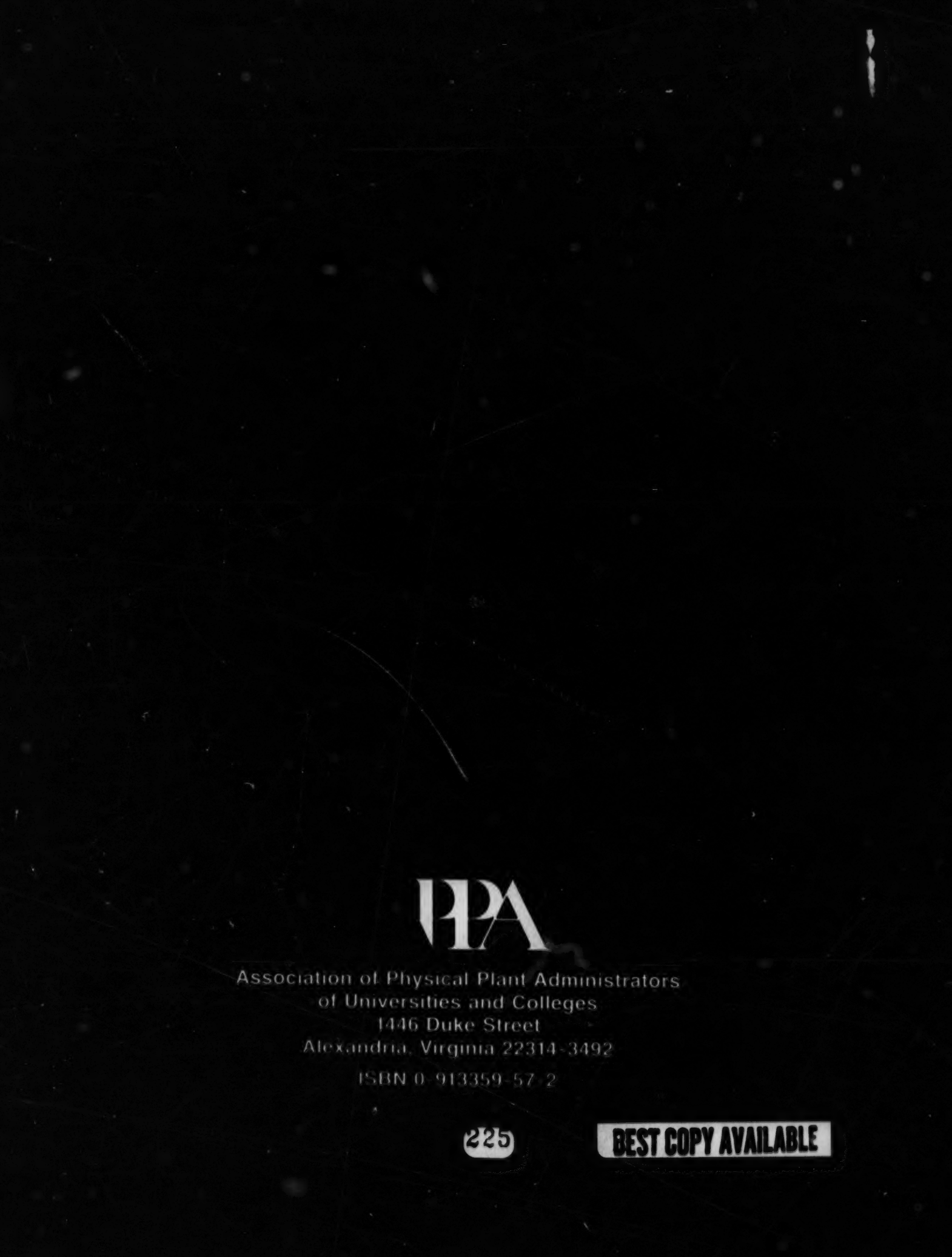

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